# *Wildlife Management*

## *For Tennessee Landowners*


**TENNESSEE WILDLIFE RESOURCES AGENCY**

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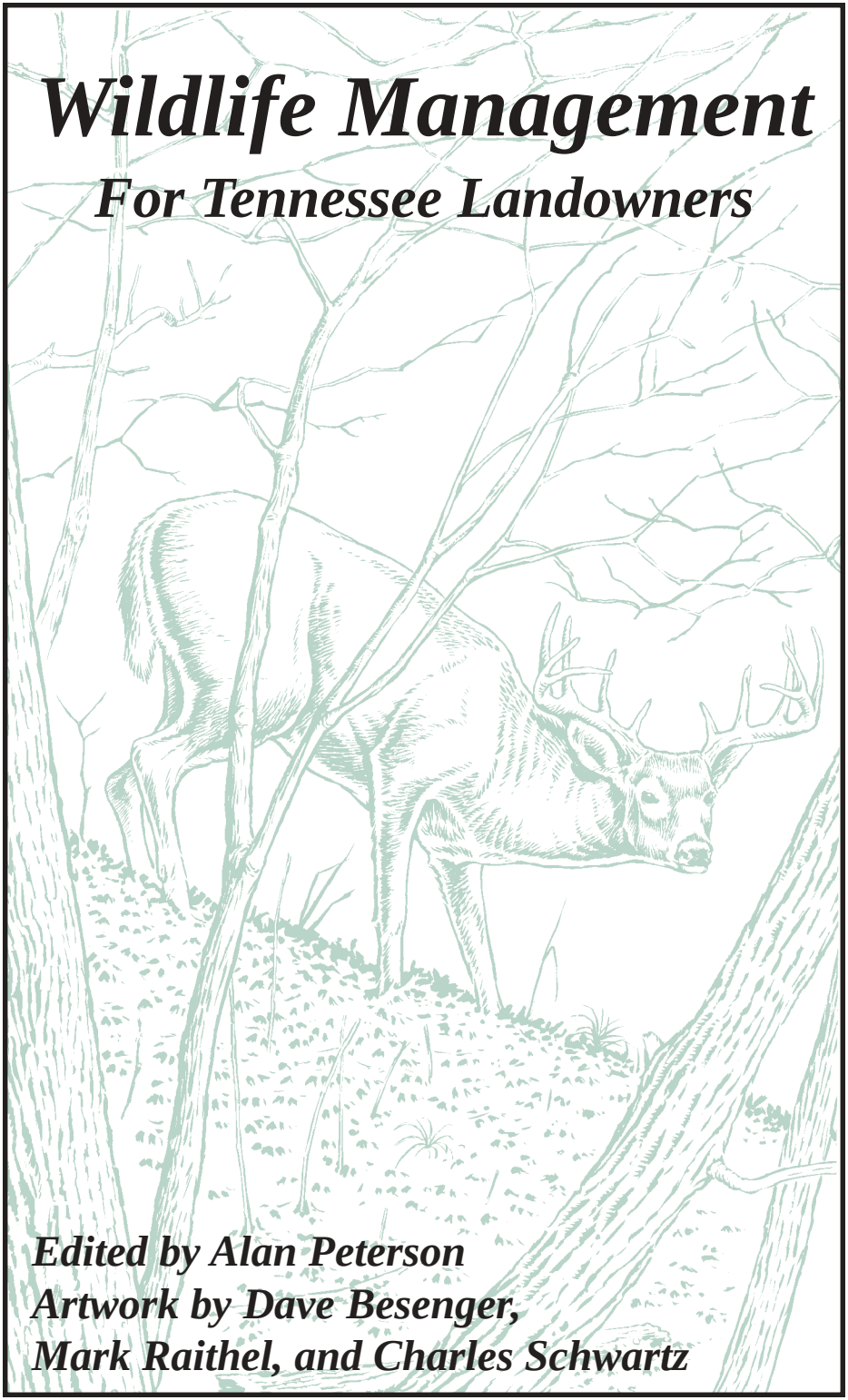

***Edited by Alan Peterson***
***Artwork by Dave Besenger,***
***Mark Raithel, and Charles Schwartz***

# Acknowledgments

The following people have contributed to various parts of this handbook (in alphabetical order):

**Tennessee:** Dick Conley, Charles Dixon, Mark Gudlin, Ed Harsson, Jim Johnson, Ben Layton, Wade McMahan, Brant Miller, Billy Minser, Alan Peterson, Reggie Reeves, Doug Scott, Robert Smith, Tim White, Carl Wirwa, and Dave Woodward

**Missouri:** Randy Ardnt, Ken Babcock, Dennis Browning, Reggie Bennet, Steve Clubine, Carl Conway, Christopher Dalton, Dave Erickson, Ray Evans, Floyd Ficken, DeeCee Darrow, Dianna Hallett, Robert D. Kemp, Don Martin, William McGuire, David E. Pitts, Donald J. Smith, David Urich, Joel Vance, Larry Vangilder, David L. Wissehr, and Steven J. Young

**Arkansas:** Martin Blaney, Mike Cartwright, Stan Chapman, Rick Fowler, B. J. Hankins, David Long, Alicia Lupkes, Don McKensie, Mike Pledger, Karen Rowe, Jon Schneider, Nick Smith, Jim Spencer, Jim Sullivan, Fred Ward, and Mike Widner

Printed by the Tennessee Wildlife Resources Agency, Nashville, Tennessee

Revised from ***Wildlife Management for Missouri Landowners*** and ***Wildlife Management for Arkansas Landowners***.

Used with permission of the Missouri Department of Conservation and the Arkansas Game and Fish Commission.

Edited by:
Alan Peterson, Wildlife Biologist
Tennessee Wildlife Resources Agency
Jackson, Tennessee

Department of Tennessee Wildlife Resources, Authorization No. 328653, 10,000 copies, January 2002. This public document was promulgated at a cost of $1.10 per copy.

# Sponsors

We wish to gratefully acknowledge the generous contributions of the following who made this publication possible.

Quail Unlimited
www.qu.org
National Headquarters: (803) 637-5731
State Chapter: (931) 779-4868

National Wild Turkey Federation
www.nwtf.org
(803) 637-3106

Tennessee Wildlife Resources Foundation
email: twfoundation@heartoftn.net

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www.conservetn.com
(615) 353-1133

Nashville Chapter Tennessee Ornithological Society
www.tnbirds.org

# Contents

# Introduction

One of the most common questions heard by wildlife departments across the country has always been, "What can I do to help wildlife on my property?" For decades, ever since the inception of modern wildlife management and the creation of state wildlife agencies, state biologists have been perceived by the public as the wildlife experts to contact for answers to wildlife questions. Information has been repeated verbally countless times through one-on-one contacts between biologists and individual landowners, consuming countless hours.

This manual is an attempt to answer some of the most often repeated questions asked by landowners to provide quality habitat in Tennessee.

This manual is not an attempt to prevent *all* contact between landowners and state biologists. Often, both landowners *and biologists* benefit from personal meetings. In many instances, special circumstances or conditions require an on-site visit to determine the best way to manage habitat for wildlife. In those cases, biologists should be contacted, but if this manual helps solve simple problems with sound, simple, common advice, it will have served its purpose.

When biologists of the Tennessee Wildlife Resources Agency began discussing the need for a wildlife management manual for Tennessee landowners, the first step was to look around at other states and state wildlife departments to see if anyone else had already produced such a manual. Thankfully, an excellent publication was already in print, produced by the Missouri Department of Conservation and an Arkansas version had already been adopted from the Missouri publication. It is with gratitude that we acknowledge, and freely admit, that most of this manual has been taken wholesale from Missouri's publication, "Wildlife Management For Missouri Landowners." We deeply appreciate the permission granted from the Missouri Department of Conservation and the Arkansas Game and Fish Commission, allowing these manuals to simply be modified for Tennessee. The savings in time and effort have been immeasurable.

*- Alan Peterson -*

# CHAPTER 1

# *Wildlife and the Land*

Perhaps you enjoy hunting, or take pleasure in the fruits of the hunt, such as a well-spiced venison stew on a frigid winter's day. Maybe you enjoy the call of a quail on a spring morning, or the hooting of barred owls under a harvest moon. If so, you no doubt appreciate the value of Tennessee's rich wildlife heritage.

If you are a landowner, you may want to maintain that heritage on your own land. The purpose of this booklet is to help you with this important and enjoyable task.

Wildlife has taken a roller coaster ride since pioneers settled the Tennessee wilderness. Wildlife was once abundant and often taken for granted. By the mid- to late 1800s things had changed. The plow was eliminating wildlife habitat of the prairies and destructive logging practices, followed by extensive wildfires, degraded much of our forests by 1900. Market hunting for meat and fur exacted a heavy toll on wildlife populations. Deer, bears, and turkey dwindled; elk, buffalo, and cougars were driven from Tennessee. The passenger pigeon and Carolina parakeet became extinct.

On the other hand, the many small, private farms that had been carved out of the wilderness proved to be good habitat for smaller wildlife such as quail, rabbit, skunk and dove. Islands of grain and grass were planted by farmers, creating a healthy mix of woods, brush, brushy fencerows, crops and grasses.

The wildlife "roller coaster" has continued through the years. Many species that were reduced in numbers have been restored to abundance in Tennessee, thanks to public support for wildlife research and controlled harvest. Recently, however, some of these restored populations have suffered as financial pressures forced farmers to focus on short-term profits to pay the bills. In the name of efficiency and economic survival, fields have been enlarged, fencerows removed, woodlands grazed or cleared, and neglected areas put into production. Because of a loss of food and cover, wildlife have either moved to more favorable areas or died from exposure, predation, or starvation. In the eastern half of Tennessee, row-crop farming has almost entirely been converted to fescue pastures and cattle, which provide poor habitat for most wildlife. Farm game species, such as quail and rabbit, have shown the most dramatic declines as a result of these farming practice changes.

Increased soil erosion also has hurt wildlife populations. The top few inches of soil are essential to wildlife survival: they sustain the plants that provide living areas, food and shelter for wildlife. For example, a covey of bobwhite quail can live on about 20 acres under ideal conditions. Their spring and summer foods are green plants and insects; in fall and winter, they eat weed seed and grain residues. They receive most of the moisture they need from these foods. In summer they can find shelter in grassy and

weedy areas, but need dense brush during the cold months. Many of these things depend upon rich topsoil. Erosion removes vital soil and lowers the basic productivity of the land. Quail will not do well if any of the above elements are missing or are far apart. Animals are vulnerable to prey and weather if the habitat for survival is missing or in short supply.

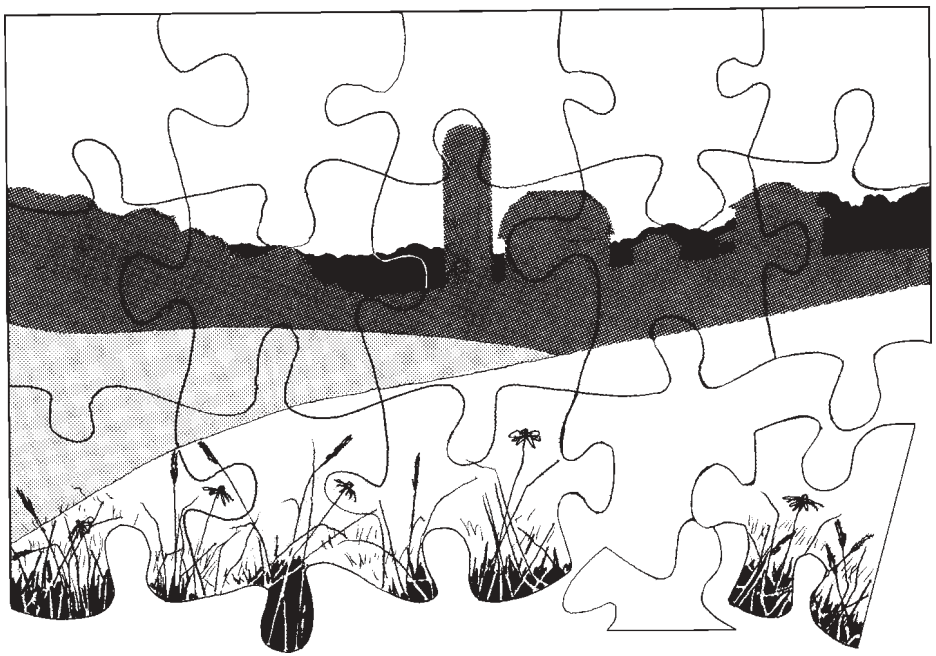
These trends (declining wildlife and increasing soil erosion) are disturbing, but by no means irreversible. Tennessee landowners can make great inroads into these problems simply by improving habitat for wildlife on their own land. This booklet describes a number of techniques (many of them quite simple) that can be used to increase wildlife diversity and abundance on private land.

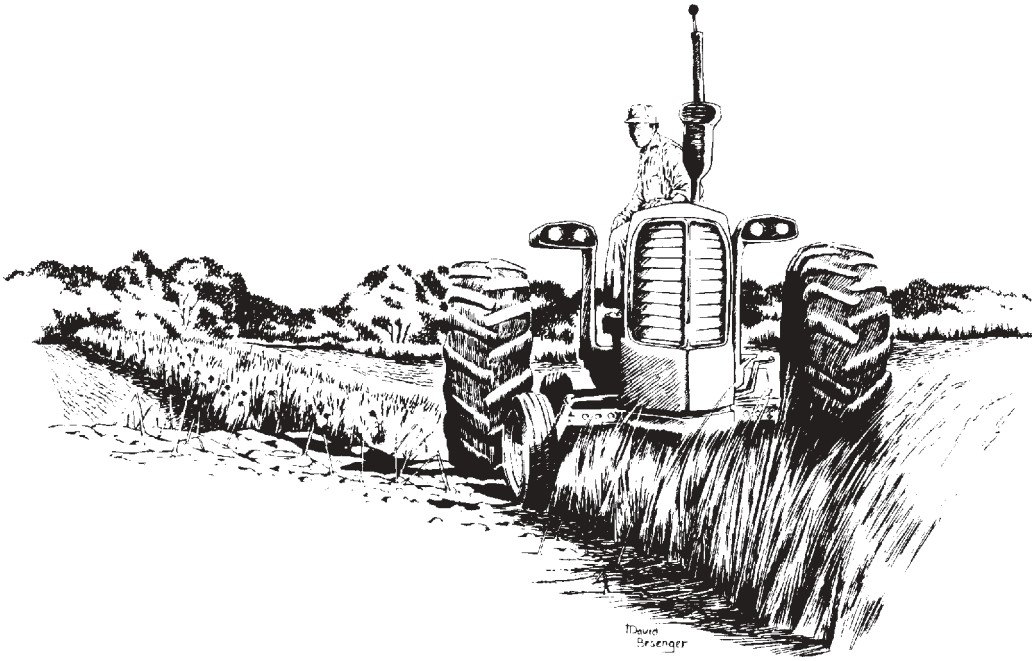
Many Natural Resources Conservation Service soil-saving practices are also included in this booklet. Landowners have found that practices which save soil can often be beneficial to wildlife.

The benefits of managing land for wildlife are many, but there are also costs. Fortunately, many state and federal agencies offer partial reimbursement for landowners unable to absorb the expense. Some management practices have economic benefits of their own. For example, fencing a woodlot from livestock will improve both timber value and production, while increasing long term profits.

Think of Tennessee as a giant puzzle with tens of thousands of pieces, each of which represents a tract of land. Over 90 percent of these puzzle pieces would be private land.

Landowners have played a leading role in wildlife production through the years. This handbook will help you get started improving wildlife habitat on your piece of the puzzle. Remember that it takes dedication to follow through with your wildlife conservation plans, but it can be done and EACH LANDOWNER CAN MAKE A DIFFERENCE. If you do not own land, this handbook will increase your knowledge of






the balance between wildlife and the land, and provide valuable information to pass along to a landowner friend.

CHAPTER 2

# *Land Planning for Wildlife*

Successful habitat improvement begins with a thorough evaluation of your land for its wildlife habitat potential. After you have made this "wildlife habitat inventory," you can draw up a management plan that will not only increase the number and diversity of wildlife on your land, but also increase its overall productivity and value.

## Evaluate Your Land

There are three essential ingredients of good wildlife habitat: Food, cover, and water. When evaluating your land, always keep them in mind.

**Food -** Look first at the plants on your property - the amount and distribution of trees, crops, brush and grass. Vegetation largely determines the types of animals that can live on a plot of land. Plants are the basis of nature's "food web," of which every animal is part. Plant-eating animals - such as deer, rabbits and insects - convert plant energy to protein and fats. Carnivores - hawks, owls, bobcats, predatory insects and insect-eating birds - feed on the plant eaters. This complex food web will collapse without plants.

**Cover -** Cover is essential and will be discussed throughout this booklet. Both natural and manmade cover provide nesting, roosting, resting, protection and foraging areas. Natural cover is managed by planting, pruning, thinning, burning, or clearing. Simply allowing wild vegetation to grow unimpeded is also a good option to provide cover. Manmade cover includes brush piles, nesting boxes, rock piles, birdhouses, log piles and similar structures. Interspersion of cover is important to developing optimum wildlife habitat. Most species will not use areas which are too far from escape cover.

**Water -** Also note the sources of water. The wildlife in Tennessee has varied water requirements. Salamanders need a fish-free pond for spawning. Bobwhite quail need surface water only during long, extremely dry periods. Water may become the focal point of a wildlife plan because it is a limiting factor for some animals, such as aquatic turtles, water snakes, amphibians, waterfowl, and furbearers and fish.

**Keep a Journal -** Familiarize yourself with your land. It will help you know what animals live there and what others you would be able to attract. Take notes often and during all seasons. Land and animals change through the year, and you will see new signs during each trip. Look for evidence of animals -scratch marks, tracks, burrows, nests and other signs. Note the areas they are using, and the times you observe them.

**Identify Habitat Types -** In your evaluation, it may help to divide your farm into wildlife habitat types. The four main types of farm habitat are cropland, grassland (including pasture), woodland, and idle areas.

The following questions will help you evaluate your current management of these habitat types in terms of benefits to wildlife. Ideally, you should answer "Yes" to every question.

## CROPLAND:

• Do you avoid fall plowing? The fall plowing of sloping cropland will increase erosion and eliminate crop residues that feed wildlife during the winter.

• At harvest, do you leave one or more rows of grain at the field edge? This standing grain provides food and cover for wildlife during winter months.

• Do you avoid heavy herbicide and insecticide applications? When applied in excess of label instructions, herbicides and insecticides eliminate important wildlife food sources by destroying weed seeds and insects in non-crop areas.

• Do you use no-till planting techniques? No-till planting of row crops with cautious use of herbicides and pesticides can minimize soil erosion and provide nesting and feeding cover for wildlife. Quail are eight times more likely to nest in soybeans No-till drilled into wheat stubble than in conventionally tilled fields.

## GRASSLAND:

• Do you graze livestock on a rotation among several pastures? Rotating cattle through different pastures can improve both beef production and wildlife habitat.

• Do you top-dress pastures? Improved soil fertility will contribute to both wildlife and domestic livestock productivity.

• Are native warm-season grasses included in your grazing system? Grasses that grow during the hot summer months - warm-season grasses - provide summer livestock grazing and wildlife food and cover. These grasses are also drought resistant.

• Are there legumes in your pastures? Legumes add nitrogen to the soil, help improve forage for livestock, and attract insects on which some species of wildlife feed.

• Would you be willing to set aside small portions of pastures or hayfields for wildlife use?

## WOODLOTS:

• Do you prevent cattle from grazing your woodlot? Woodlots and woodlot edges are prime wildlife habitat in Tennessee. Cattle can eliminate understory vegetation that provides wildlife food and cover and can damage trees through soil compaction in heavily grazed areas. Woodlots should be protected from the competition of grazing cattle.

• When you harvest timber or cut firewood, do you build brushpiles from the trimmings rather than burning them? Brushpiles around a woodlot leave an uneven, brushy edge which provides food and cover for wildlife.

• Have you maintained a border or edge between the woodlot and other habitat types? Fields that adjoin a wooded area are more attractive to wildlife when a grassy or shrubby border is established and maintained.

• Have you had a professional forester evaluate your woodlot and make forest management recommendations for improving the quality and health of the forest? A forester will help you manage your forest in a manner that best meets your goals as a landowner.

• Have you sought assistance through state and federal forestry assistance programs? Several programs are available, including the Tennessee Forest Stewardship Program. For information about available programs, contact the Tennessee Wildlife Resources Agency regional office in your area.

• Do you protect one or two den trees per acre for wildlife nesting and denning?

• When harvesting stands of timber, do you make special provisions for protecting streams and managing logging roads and logging decks for wildlife?

### FENCEROWS AND OTHER IDLE AREAS:

• Have you allowed fencerows to grow up in shrubs, vines and small trees? Fencerows provide travel lanes between different habitat types if woody plants are present.

• Do you avoid applying herbicides and pesticides to fencerows? Destroying fencerow vegetation reduces both the food supply and the cover that these areas provide.

• Are brushy or grassy strips present between crops, pastures and woodlands? These buffer strips provide necessary cover, nesting and feeding areas for wildlife if they are not mowed frequently.

• Do you provide brushy buffer strips along streams to protect water quality and provide wildlife habitat?

If you answered "No" to one or more of these questions, you might consider adding these practices to your management plan. These questions will be addressed in detail in this manual.

## Make A Wildlife Management Plan

Begin the farm plan by obtaining a drawing, map or aerial photo of your land. A photocopy of an aerial photograph is available at no charge to the landowner from the Farm Services Agency office in each county. Enlarged copies are available for a small fee.

On the map or photo, mark different habitat types with colored pens. Each type of habitat meets different wildlife needs, so for best results they should be intermixed on your property. Note areas that


are isolated from other habitat types. Some animals, such as quail and rabbits, require that the habitat types be close together; others, like deer and turkey, can easily travel several hundred yards to find food, cover or water. Also note which habitat needs are present or missing on adjacent lands. Often habitat on your land which is missing or limited can be developed.

Next, mark areas that might be improved for wildlife. Land can be

improved in a general way - for instance, by letting fields or field borders lie fallow for songbirds, quail, and rabbits - or it can be improved to attract, maintain or increase certain species of animals as with brushpiles for rabbits. In the latter case, you'll need to learn the animals' habitat requirements: how much territory they need, what they eat and where they find cover. (The requirements of some common wildlife species are given in Chapter 8.)

Usually your habitat improvement will involve adding or removing vegetation. In fact, wildlife management is basically plant management; landowners can change wildlife numbers on their property by changing the supply and distribution of plants that attract, feed and shelter them.

You can add plants that provide food for rabbits and other ground feeders, if that's what you are interested in. Or, you may want to cater to deer or other animals. Your wildlife plan should ensure an all-season variety of seeds, berries, green vegetation, and insects. This sometimes means manipulating the growth of some trees and shrubs.

A soils map can help you find the best locations for plantings. A detailed soils map or Soil Survey of your area is available from the Natural Resources Conservation Service (see Chapter 9). This booklet will also indicate the suitability of sites for pond construction. A publication detailing pond construction is available from the NRCS.

Keep a notebook of your progress. Include notes as to when, where and how the plantings and other improvements were carried out. This record will help you plan ahead and avoid mistakes. Take photos of habitat changes. Before-and-after photographs of the land show whether or not you are getting results. You can also talk to neighbors and representatives from service agencies who can offer insights on the long-term soundness of your plan.

Landowners often assume that large numbers of wildlife will remain permanently on their property if they improve food and cover areas. Usually, the effects of habitat improvements are less dramatic. Your acreage may not gain a permanent flock of turkeys or a herd of deer, but it may become an important part of their range. Your efforts make a difference, even if wildlife use your land only seasonally or temporarily. However, habitat management and hunting practices of your neighbors also affects wildlife on your land.

The following chapters describe a large number of management practices you can include in your habitat improvement plan. Often, wildlife responds slowly to changes in habitat, so the main thing is to get started NOW, but be patient.

CHAPTER 3

# *Cropland Management*

**M**inor changes in an area's crops can have a major effect on wildlife numbers. This chapter discusses management practices for cropfields and adjacent areas that are practical, profitable and beneficial to wildlife.

## Crop Fields

### Conservation Tillage

Many land managers consider conservation tillage, commonly called No-till, to be the most promising single practice for reducing soil erosion. It can also be beneficial for wildlife, especially quail, rabbits, turkeys, doves, waterfowl, and songbirds.

Conservation tillage is a broad term that refers to several tillage methods that maintain crop residue - stubble, grain and other plant seeds - on the field surface and eliminates the need for annual plowing. These tillage methods control erosion, conserve soil moisture and increase organic matter, resulting in better field soil conditions. Studies have shown that conservation tillage fields can have yields that equal or exceed conventional tillage fields. In addition, production costs are less for conservation tillage systems. In short, farmers can earn more money per acre using no-till or conservation tillage methods and in the process improve wildlife habitat. However, provisions must be made around the cropfield for travel, nesting, and escape cover or the benefits of food in the cropfield will be of little use.

Crop residues from conservation tillage provide both food and cover for wildlife. In particular, waste grain and weed seeds left after harvesting are staple foods for wildlife in winter. However, conservation tillage alone will not increase wildlife. Adequate cover around crop fields must be provided for wildlife to increase. Plowed fields are virtual deserts for wildlife. If you must plow in the fall, plow only a portion of the field and leave the field borders for spring tillage.

Currently, conservation tillage methods dictate an increase in pesticide use. Proper application of these pesticides will reduce both production costs and hazards to the environment.

## Crop Rotation

Crop rotation is simply the planting of different crops in the same field from year to year. Long term rotation means planting three or even four different crops before returning to the original crop. These practices increase the health of the cropping system and add plant diversity to the land for wildlife.

Continuous cropping means that the crops in a field do not change each year. Crop disease experts report that the highest risk for crop diseases results from continuous cropping. Insect problems are also more prevalent under this system, so more pesticides are needed. Most corn and soybean diseases and associated pests can be controlled by a simple crop rotation.

Legumes are always a good choice - and often a necessity - for rotation because they add nitrogen to the soil and reduce fertilizer requirements for next season's crop. Sweet clover, for example, can produce up to 174 pounds of plant nitrogen per acre. Legumes also make good wildlife nesting cover and food if mowing is delayed until after July 15. Clovers and vetch can be seeded into row crops after the last cultivation to reduce erosion, add nitrogen and provide wildlife cover during the winter (see Legume Seeding Chart, Chapter 10).

Small grain crops, such as wheat, barley, and oats, can provide nesting cover throughout the spring and summer. The stubble of these crops, cut high and left undisturbed, makes excellent brood-rearing habitat for quail. The seeds of annual plants associated with small-grain stubble provide food for wildlife.

Legumes and small grains help prevent soil erosion. Good rotation crops for sloping fields include corn or milo, soybeans, wheat, barley, or oats, and clover.

## Contour Strip Cropping

The practice in which row crops are planted in strips along the natural contour of the slope and next to a grass strip is referred to as contour strip-cropping. It provides erosion control and plant diversity.

The strips of grass, legumes or small grains act as a filter that traps sediment and slows water runoff. The strip width is dictated by the severity of the erosion problem and the slope of the field. Where erosion is severe, permanent grass strips should be maintained between strips of crops. These strips should be seeded to a grass/legume mixture that is beneficial to wildlife (see Chapter 10). All of the listed grass/legume mixtures produce high-quality hay. In some years, the seed and hay harvested from these strips can produce more income per acre than the adjacent row crops.

Strips seeded to grass/legume mixtures serve as travel lanes and

cover for wildlife. These strips also provide nesting and roosting cover and, if possible, should not be mowed until late August.

*Row crops planted on contours. (TWRA photo)*

## Field Borders, Fencerows and Turn-Rows

Field borders can be seeded to grass/legume mixtures that are attractive to wildlife (see chart, Chapter 10).

When planted around cropfields, native warm-season grasses and other grasses such as redtop and timothy serve as valuable nesting, brood-rearing and concealment cover for wildlife. These grasses may be hayed in July when adjacent crops provide cover.

Field borders next to woodlots, wooded fencerows, hedgerows and other brushy areas offer more opportunities for wildlife. Shading and root competition from trees and shrubs in these areas can be minimized with the use of a tractor-drawn root plow, which prunes the roots of woody plants.

Turn-rows planted to a grass/legume mixture will help control soil erosion, provide space to turn equipment and serve as a roadway along the edge of the field. Grass/legume borders also provide cover for ground-nesting birds such as meadowlarks and quail. These areas should be clipped at two-year intervals to prevent woody sprout

invasion. Clipping should be done in August, after the peak of the nesting season.

Another inexpensive method for creating field borders is to disk a strip 15 to 30 feet wide around the field and let native vegetation of weeds and grasses grow. If the strip is currently in fescue, it should be killed with an herbicide. To maintain the border, about one third should be mowed or burned each year leaving the other two thirds as nesting, travel, and feeding cover.

*Field borders. (TWRA photo)*

## Fallow Fields and Set-Aside Acres

Fallow fields are cropfields which lie idle during part or all of the growing season, for one or more years. Fields are often allowed to lie fallow to let the soils to recover from continuous cropping. These fields provide wildlife with the old-field weeds and grasses they need for food and cover. In many cases, simply allowing native vegetation to become established will provide excellent food and cover. Much of what is commonly thought of as "weeds" are, in fact, highly beneficial for wildlife and many of these "weeds" are the natural vegetation which sustained wildlife populations before the invention of the plow.

In other cases, especially to prevent erosion, fields left idle may need a vegetative cover to be planted. Some plantings that benefit wildlife on fallow and set-aside acres are:

- Native warm-season grasses, such as big bluestem, little bluestem, Indiangrass, eastern gammagrass and switchgrass.
- Trees and shrubs.
- Annual grain food plots.
- Cool-season grass/legume plantings, such as orchardgrass, red clover, and ladino clover, or timothy and kobe or Korean lespedeza, or a similar mix.

Chapter 10 gives suggestions on seeding rates and mixtures.

Fallow fields may be maintained by burning every 2-3 years. To provide continuous nesting cover, have 2-3 other fallow fields around the farm which can be burned in rotation.

*Fallow field. (TWRA photo)*

## Grassed Waterways

Grassed waterways may be used as outlets for water collected by terrace systems on crop fields.

These waterways vary in size according to the size of the drainage area and are seeded to perennial grasses, legumes or both to protect the quality of streams.

A grassed waterway is not needed in all terraced areas. In many cases a wooded draw may function as an excellent water outlet for terraces if it is not actively eroding. Grassed waterways provide grazing for deer and other wildlife and insect production for turkey poults and quail chicks. In addition, wooded draws can provide critical woody cover for wildlife.

Most of the native warm-season grasses can be planted on grassed waterways to help control erosion, provide wildlife cover and produce high-quality hay. Cool-season grasses, such as orchardgrass, timothy or redtop can be planted in these areas, also. They should be mowed after the peak of quail nesting in late August.

## Terraces

A terrace is an earthen embankment built on the elevation contours of a crop field to intercept runoff water. Terraces, by design, divide long, steep hillsides into a series of shorter slopes to reduce erosion. The terrace channel is sloped toward a grassed waterway, a wooded draw, or an underground outlet so that water runs off without creating a gully.

Most grass/legume mixtures are suited for seeding these terraced slopes, although the use of fescue should be avoided whenever

*Grassed terrace. TWRA photo.*

possible. Fescue quickly becomes too thick to allow movement of small species and has very poor food value for wildlife. Switchgrass works particularly well and develops into travel lanes, nesting areas and cover areas for wildlife. Woody shrubs that invade the switchgrass strip can be controlled with periodic burning, chain saw or spot herbicide treatment.

## Field Shelterbelts, Windbreaks and Fencerows

Trees planted as windbreaks can reduce wind velocities on their downwind side for distances up to 10 to 20 times the height of the trees, depending upon the species and density.

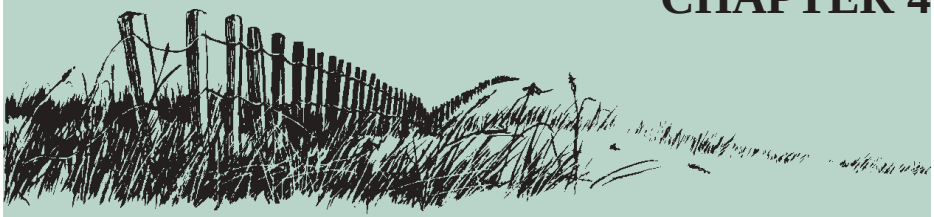
Hardwood or deciduous trees, which shed their leaves in the fall, are not as effective as evergreens for winter protection. Their bare limbs do reduce wind velocities and offer some amount of protection, however. The advantages of hardwood trees are that they are hardier, grow faster and are taller at maturity than evergreens. Field windbreaks reduce soil erosion, conserve soil moisture and provide food and cover for wildlife.

Woody fencerows next to cropfields provide many of the same benefits as windbreaks. Natural woody fencerows can be encouraged by not spraying or mowing next to the fence. This is the least expensive way to create woody fencerows. When protected from grazing and clipping, fencerows can develop into natural travel lanes for wildlife. Planting clumps of trees and shrubs or spreading seeds of vines and shrubs along the fencerow also helps.

## Cropland Management Tips:

- ✓ Establish conservation tillage systems (No-till).
- ✓ Avoid fall plowing unless absolutely necessary. If you fall plow, leave unplowed borders or strips for spring plowing next to the field border.
- ✓ Minimize pesticide and herbicide applications.
- ✓ Rotate crops to include forage and small-grain crops.
- ✓ Use winter cover crops for green browse, erosion control and wildlife cover.
- ✓ Plant grass/legume border strips around all or a portion of crop fields. Mow, burn or disk these strips at two-year intervals to control woody vegetation.
- ✓ Allow shallow draws to revegetate naturally, or plant to native warm-season grasses or a grass/legume mixture. Delay mowing until late August to avoid nesting losses.
- ✓ Seed waterways to native warm-season grasses or a grass/legume mixture that is beneficial to wildlife. Delay mowing until after the peak of the nesting season, August 15.
- ✓ Establish grass filter strips around crop field ponds to reduce sedimentation and to add wildlife cover.
- ✓ Protect woody draws and fencerows.
- ✓ Leave a minimum of one-quarter acre of grain crops unharvested for each 20 acres of crop field.
- ✓ Leave unharvested grain crops in patches or strips next to shrubby cover.

CHAPTER 4



# Grassland Management

Grasslands provide many kinds of wildlife with food and cover. The grasshopper sparrow and meadowlark and many other songbirds are open grassland nesters. Rabbits, bobwhite quail, and turkeys also nest in grasslands, but prefer areas near woods or brush. Grasslands also provide habitat diversity for other wildlife, such as small mammals, box turtles, and birds of prey. Grasslands also help wildlife by controlling soil erosion.

Grasslands can be divided into three categories:

1) **Cool-season grasslands** (containing grasses such as orchardgrass, timothy, tall fescue and redtop, which grow best in cool weather);
2) **Warm-season grasslands** (containing native grasses such as Indian grass, big and little bluestem and switchgrass, which grow best in warm weather); and
3) **Native grasslands** (unplowed prairie remnants dominated by native warm-season grasses).

This chapter deals with the management opportunities on the nearly 13 million acres of grasslands in Tennessee. The first section describes some general management techniques for pastures or grasslands. Not all of these techniques are suitable for every grassland. Specific management techniques for each of the three types of grasslands are given in the following sections.

## Grasslands In General

Management is usually necessary to keep grasslands productive. When grasslands are left idle, forage production is reduced as ground litter builds up. This build-up restricts the movement of wildlife such as bobwhite quail and rabbits. Five methods commonly used in grassland management are grazing, haying, fertilizing, over seeding with legumes, and prescribed burning. (Note: Native prairies may require special management practices, see section on Native Grasslands.)

### Grazing

Grazing can be continuous or rotational. Continuous grazing is where all animals are placed in one pasture and allowed to selectively graze. Rotational grazing may be as simple as switching

livestock between two pastures; or, if practical, livestock may frequently be moved among several pastures.

Grazing affects both the plants and the soil in pastures. Livestock are selective about the plants they eat. They tend to repeatedly graze some plants and ignore others. This weakens the more desirable plants and allows unwanted plants to thrive and multiply. Nearly all pastures have areas where livestock concentrate, such as around water, bedding grounds and feeding areas. If the pasture is continuously grazed, these areas become overused, resulting in pasture deterioration.

Continuous grazing reduces forage production and eliminates wildlife cover and food. Cattle trampling also destroys wildlife nests. Years of continuous overgrazing can change a grassland to a brushy area with undesirable plants. Grasses that are continually overgrazed will produce less and less forage in each successive year. Under certain management objectives and pasture conditions, however, continuous heavy grazing may be used as part of an over-all program to improve grazing distribution.

When land is rested - left idle between grazing periods - the vigor of the choice plants increases, giving them a chance to grow and multiply. This gradually increases the number of high-quality plants per acre. Improved forage increases livestock production, improves wildlife food and cover, reduces soil erosion and conserves water.

Rotational grazing allows you to pasture more cattle together and also allows wildlife to use the rested pastures and areas adjacent to the fenced pasture. Rotational grazing permits the use of forages when they are at peak production, protein content and palatability. It also helps the growth of legumes (such as clovers) and allows wildlife nests to survive, if the rest period is not too short. Rotating between pastures with native warm-season forages and those with cool-season forages increases productivity but requires careful management. Warm season grasses can be damaged by overgrazing.

A grazing system will work well only if the grass or forage is adequate to support the livestock numbers, so keep stocking rates in mind. If your main objective is to produce the maximum amount of forage from your grasslands, you may want to investigate the use of a management intensive grazing program. Here, the livestock is rotated among smaller pastures at very short intervals. Contact your University Extension or Natural Resources Conservation Service office for details.

## Haying

Timing of hay cutting is one of the most important landowner-controlled factors in managing grasslands. Cutting hay too early may reduce production, but cutting too late will not allow grasses to

replenish their root reserves before winter. This weakens a stand of grass. Wildlife cover is also reduced due to the lack of regrowth. Haying should be timed so that yields and quality are optimum. If wildlife considerations can become a part of the haying operation, cutting part of the hay field at different times of the year will increase habitat diversity.

Cutting height also has an impact on grasses. Clipping grasses too low will remove the point (the node) on the grass stem where new growth occurs. Regrowth of the grass will be slower because the "growth point" has been removed and the new leaves must now grow from the dormant buds located lower on the stem. Warm season grasses should not be cut lower than eight inches above ground level.

Haying has a dramatic impact on both the landscape and wildlife. With the ground bared, wildlife is vulnerable to predation, and the animals must move to adjacent areas for cover. If there is no room for these new animals, some will starve or be killed by predators.

## Fertilizing

Both haying and grazing will remove nutrients from the soil. Fertilizer and agricultural limestone should be added to a pasture or hayland only after the soil is tested (see Chapter 10). If you are unfamiliar with soil tests, the results can be interpreted by your local University Extension Agronomist. Remnant native prairies may or may not require that fertilizer or limestone be added (see Native Grasslands).

## Over seeding With Legumes

Legumes, such as clovers and lespedezas, remove nitrogen from the air and add it to the soil, where it is then available for other plants. Improved livestock performance has been shown with the addition of a legume to a cool-season grass diet.

The success of over seeding an established pasture with legumes will vary. Consult the agricultural agencies or Tennessee Wildlife Resources Agency office in your area for the current recommendations on legume varieties, seeding dates and methods. Some grass/legume seeding mixtures that are beneficial to both livestock and wildlife are shown in Chapter 10. Remnant prairies will usually have native legumes present and will not require over-seeding under a good grazing, burning and haying program.

## Cool-Season Grassland

Cool-season grasses, such as redtop, orchardgrass and timothy, begin growth early in the spring when the soil reaches 40 degrees F. Their growth slows during the warmest part of summer when the soil reaches 78 degrees F. and resumes as the soil cools in the fall. Timothy and redtop mature later than tall fescue or orchardgrass. These grasses would allow a later haying date of high quality forage, while avoiding nest destruction that would occur with earlier haying dates. Cool-season grasses have been popular with farmers because they are easy to establish, withstand heavy grazing and respond to heavy fertilization. Most of these grasses continue to be productive, but tall fescue can cause health problems in livestock. For beef cattle alone, losses in Tennessee are estimated to be $60 to $85 million per year. The problems associated with endophyte infected fescue are still under study. Fescue provides little food value for wildlife and grows to thick to allow movement of small wildlife species. For assistance in a fescue eradication program, contact your local Tennessee Wildlife Resources Agency office.

Cool-season grasses are usually grazed to within 2-4 inches tall. Grazing below this height will result in lower production, increased soil erosion and less wildlife use.

These grasses are normally at peak quality and ready for cutting during the nesting season. If the usual cutting height of 1-2 inches is raised to around 4 inches, the disturbance to ground-nesting wildlife is reduced.

Cool-season grasses usually do better in higher pH soils. Soil pH can be raised by adding agricultural limestone.

## Warm-Season Grasslands

Many landowners are rediscovering our native warm-season grasses and their value to forage systems. These grasses, such as native bluestems, switchgrass, eastern gammagrass and Indian grass, are also good for wildlife. The growth pattern of these grasses is compatible with legumes and other broad leaf plants that are important to both wildlife and livestock. (see Establishing Native Grasses, Chapter 10.) NOTE: Although bermudagrass is a warm season grass, it is not native to the United States and does not provide desirable wildlife habitat.

When the soil reaches about 60 degrees F. in the spring, the warm-season grasses begin growing.

They grow best during the warmest months of the year, when the soil is about 90 degrees F. (June, July, and August.) Although warm-season grasses have a shorter growing season, they make more efficient use of water and soil nutrients - nitrogen, phosphorus and potassium - than do other grasses.

## Grazing

Native warm-season grasses should not be grazed closer than eight (8) inches high. Since warm season grasses begin growth later in the year, they are usually not ready to be grazed until mid summer, when most of the ground-nesting wildlife have hatched their broods. Under a good management program (burning, rotation, etc.), however, native grasslands can be grazed earlier in the summer.

## Haying

Native warm-season grasses are usually hayed in mid to late June and July - again, after many of the broods have hatched. These grasses should not be cut closer than eight (8) inches to allow for rapid regrowth. The regrowth should not be grazed, nor should a second cutting be taken. A second cutting will reduce the vigor of the plants, weaken the stand, and eliminate important winter cover and spring nesting cover.

Eastern gammagrass is an exception. A mature stand may be hayed two or three times during the year. Gammagrass is fast growing ad has been shown to grow three to four inches following haying in a 48-hour period. It should not be cut lower than five to six inches above ground level.

Prescribed burning Warm season grasses may be easily maintained with fire through controlled burns if haying or grazing are not desired. (See: Prescribed Burning in the **Native Grasslands** section below and in **Chapter 6**)

## Fertilizing and Liming

While studies have shown that native warm-season grasses are very efficient at removing nutrients from the soil, they do use large amounts of phosphorus (P) and potash (K). These elements should be replaced when hay is removed. These grasses usually do not require that as much fertility be added to the soil, as do the cool-season grasses. The addition of Nitrogen is not recommended during the first year of establishment. Studies have shown, also, that yields, crude protein, estimated net energy, digestibility, and relative feeding values were increased in big bluestem/Indian grass hay when the grasses were fertilized with nitrogen. The major increases occurred at rates of 50 or 100 pounds of nitrogen per acre, with 50 pounds per acre giving the greatest return on the dollar. Nitrogen should be applied only in combination with prescribed burning to avoid problems with cool-season grasses and weeds. (Note: Fertilization of remnant native prairies is recommended only under certain conditions.)

Another advantage of native warm season grasses is that they do

well on poorer soils. As long as the soil pH is 5.5 or greater, it is not necessary to add lime.

### Over seeding with legumes

Legumes may be overseeded on new warm-season grass plantings during the second year or after the grasses have become established.

## Native Grasslands

Tennessee's native grasslands, or prairies, were once a small, but important part of our state. A major prairie, supporting bison, elk, and prairie chickens, existed from Nashville north into Kentucky. These prairies were dominated by warm-season grasses and supported several hundred species of plants. Many prairies reverted to forests when burning of the land by Native Americans and the early pioneers ended. Today, less than one percent of our original prairie remains. Most has been replaced by cropland or introduced warm-season or cool-season grasses. The small remaining tracts are referred to as remnant prairies and are vital to the survival of Henslow's sparrows and other grassland wildlife.

Proper management allows establishment of native prairies. Experienced personnel can provide information about the special management needed on native prairies. If you have a tract of native prairie, please contact the Tennessee Department of Environment and Conservation's Natural Heritage Division (see Chapter 9 for address) for assistance.

Native prairies, when grazed moderately, will provide excellent summer pasture. Start grazing these tracts about May 15, when the vegetation is 10-12 inches tall. Native prairies should be grazed no later than September 1, and no lower than 8 inches high.

Native prairies provide quality hay. Haying dates are more critical in prairies, as they affect not only the yield and quality of the forage, but also the types of plants that will persist.

Native prairies should not be fertilized or limed unless they are in excellent condition, because the fertilizer may be used by undesirable weedy plants. Native prairies will contain several beneficial legumes and should never be overseeded in an attempt to increase productivity.

### Prescribed Burning

Burning is an important management practice for warm-season grasslands and remnant prairies when used under the right conditions at the right time. Fire releases nutrients, controls ground litter and some unwanted plants, stimulates seed production and helps improve plant diversity within the native grassland, which helps distribute

grazing pressure.

Studies show that prescribed burns in February through early April will favor forbs (broad leaf plants), while late April or May burns will favor the production of grasses. A fire at the wrong time can be costly to both wildlife and forage production, but burning time should be varied in order to maintain plant diversity. Burn each native warm season grass (NWSG) field every 2-3 years. Maintain some NWSG fields in 1-2 year growths to provide continuous nesting, travel, and brood cover for quail and other ground nesting birds. The use of fire as a farming practice used to be much more common than it is today. Many people are wary of using fire as a tool. Use fire with great care. Experienced personnel are available to assist in the planning of prescribed burns. Contact the Tennessee Wildlife Resources Agency or Tennessee Division of Forestry office. Burning may require a permit from the Tennessee Division of Forestry.

## Grassland Management Tips:

- ✓ Use both native warm-season and cool-season grasses in a rotation grazing system.
- ✓ Investigate the possible use of a “management intensive” rotation grazing system.
- ✓ Avoid hayfields and pastures with only a single species of grass.
- ✓ Leave an unmown strip, 25-30 feet wide, around the edge of hayfields.
- ✓ Protect shrubby vegetation in drainages and along the field edges with permanent fences.
- ✓ Establish legumes in cool-season pastures and hayfields.
- ✓ Establish warm-season grass pastures.
- ✓ Allow warm-season grasses to regrow to 12-15 inches before the fall dormancy period.
- ✓ Consult a professional for details concerning the management of native grass prairies.
- ✓ Establish cool season grass/legume fire lines around all warm-season pastures and hay fields.
- ✓ Avoid the establishment or use of fescue.

# CHAPTER 5

# *Woodland Management*

The wooded areas on Tennessee farms have great potential as habitat for a variety of wildlife species. When protected, the forest interior provides food and cover for deer and turkey, den trees for squirrels and furbearers, and snags for nesting woodpeckers. The forest edge produces browse for deer and nesting areas for songbirds.

Forest and woodland habitats, left undisturbed, are altered through time by the natural forces of nature. Wind, ice, fire, floods, insects, and disease open the forest floor to sunlight and a new generation of trees. Wildlife populations are directly affected by, and for the most part, are dependent upon the results of these disturbances. As our forests are altered by these forces, sunlight is made available to the lower reaches of the forest, generating available food and cover plants for wildlife. Although the tree canopies serve as food and nesting sites for a variety of wildlife, many forest dwelling creatures are dependent upon food and cover at the ground level. This wildlife habitat within forests is gained when an ample amount of plant producing sunlight reaches the forest floor. The natural system of management takes decades and longer to result in favorable conditions for certain species of animals. As time passes with little or no natural disturbances taking place, wildlife populations rise and fall. The natural disturbances may not even occur in a particular forest or woodland and the tree canopy will close, shading out not only wildlife food and cover, but also the productive tree seedlings on the forest floor.

However, this disturbance to a forest that nature periodically provides can be imitated. The forest can be managed like a garden to produce valuable products in a sustainable supply. By using certain practices, we can improve these habitats for wildlife food and cover, and also provide the productive seedlings on the forest floor.

The main idea behind managing a forest for wildlife is that wildlife needs are required at all levels or layers within the forest. The three main levels of a forest are the tree canopy, or crown layer, where nesting, roosting, and mast production (such as acorns, nuts, and fruits) are important; the mid-story level where different species of trees grow (such as persimmons, hackberries, dogwoods, and mulberries); and lastly, the understory, or ground level. By understanding the importance of these layers, a landowner can design, through thinnings and other treatments, a multi-tier forest of desirable plants and, at the same time, have plants at the ground level growing in sunlit patches. No matter what, sunlight is a critical ingredient for food (browse) seed production, and cover in the understory.

# Hardwood Management for Wildlife

Hardwood forests, both uplands and bottomlands, provide a variety of wildlife needs. They serve as nesting sites for many species, such as cavity-dwellers like raccoons, squirrels, and wood ducks to temporary nests built by migratory and resident songbirds. Forests are diverse in vegetation and wildlife foods. Trees, vines, grasses, and forbs, produce hard and soft mast, such as acorns, hickory nuts, and berries, along with a variety of shrubs which provide green browse. In a diverse hardwood forest, there is something for every forest creature. However, left undisturbed, these forests slowly lose the richness of this variety due to the differing ability of some plants to grow more in shaded conditions. Although most plants have some value for wildlife, some are less desirable if they dominate the forest understory, crowding out more desirable, more nutritious species. If allowed to remain, these less desirable species will become the future forest in place of the oaks that dominate the canopy today. Many of the oak-hickory forests of today are a result of major disturbances like fires, storms, and the harvest of past years that allowed sunlight to promote the growth of oaks. Controlled disturbances of timber harvests and thinnings maintain diverse oak-hickory forests and help ensure a continual benefit to wildlife, both game and non-game, through the years.

One important characteristic of hardwoods is their ability to sprout from an existing root system. Most conifer species (pine, cedars) do not sprout. After a hardwood tree is cut, unless its root system is destroyed, it may sprout many stems from a single root or stump. These new sprouts can form the next forest and also provide a great source of browse for deer and other wildlife species. Hardwoods growing from an already established root system often grow much faster than one grown from a seed. Most forest and wildlife management professionals in Tennessee recommend regenerating a stand of trees using even-aged methods, clearcutting being the most common one. On large woodland tracts, wildlife habitat can be improved by the periodic regeneration of approximately equal acreage of forest by creating small clearcuts. This creates a mosaic of vigorous forest stands of all ages across the landscape, and provides a diversity of habitat conditions for a variety of wildlife species. Clearcutting and other even-aged methods are better ways to “jump start” the next forest than selectively harvesting only the best trees, which leads to “high grading”, where mostly poor quality trees are left behind. Small clearcuts (15-30 acres) also provide huge amounts of browse and cover when new sprouts, shrubs, grasses, and forbs all take advantage of the sunlight hitting the forest floor.

Best Management Practices (BMPs) should be followed during any timber harvest or other forest management activity. BMPs prevent soil erosion and the stream sedimentation that can result. Examples of

BMPs include proper road location and construction, leaving Streamside Management Zones (SMZs) of uncut trees next to creeks, and harvesting timber only during drier periods. More information on BMPs contact the TWRA or Forestry Division in your area.

Thinning is a treatment commonly used when a natural or planted stand achieves crown closure and is still young and vigorous enough to benefit from the removal of some of the trees in the stand. Thinning of the forest or woodland should be done periodically to improve growth and enhance forest health. A commercial thinning is where the removed trees are sold and produce a net income. At times, a noncommercial thinning may be necessary, where there is a investment with no financial return. For wildlife, these thinnings should result in leaving desirable species such as oaks, hickories, black gum, cherry, dogwood, and persimmon as "crop" trees for their hard and soft mast food value . Thinning also increases light to the forest floor, increasing understory plant growth which provide food and cover for wildlife. Where timber production is also an objective, leaving a suitable number of well-formed, high value trees is desirable. The oaks are some of the most valuable timber trees, in addition to supplying acorns, a major food source for many wildlife species. As the forest is opened up to sunlight, the secondary benefit of thinning is the releasing of seedling oaks that will replace the older ones. In each forest gap created from trees removed during thinning, resulting sunlight will generate a plant response that will serve as browse and cover, two critical habitat components that a mature forest normally lacks. When managing a hardwood forest or woodlot for wildlife benefits, care should be taken to always leave an ample number of den or cavity trees (3-5 per acre minimum), if available, to enable rearing habitat for cavity nesters. If your wildlife objective is directed at tree cavity dependent wildlife, even more den trees per acre should be left.

Hardwood forests that result from the planting of seeds (acorns, hickory nuts, etc.) or seedlings in old fields or reverted row crop land, or from timber harvest operations such as clearcuts are even-aged forests. These stands, if well-stocked, will become stagnated as they grow and the trees crowd together. Thinning is required in 25 to 40 years (depending upon soil potential). This can be best accomplished by removing every third or fourth row of trees and selectively thinning along the remaining rows favoring the most vigorous and well formed individual trees. This first thinning harvest will be a pulpwood or chip sale and offer very limited economic returns. Subsequent thinning harvests, every 10-20 years, should focus upon improving forest stand quality for wildlife and timber, and should yield higher income for the landowner. Most even-aged hardwood plantations are composed of oaks, but can become a diverse forest if care is taken to allow other species of trees to become established in the mid and understory.

Along with commercial and noncommercial thinning in hard-

woods, landowners can use another tool referred to as "Forest Stand Improvement" or "FSI." This treatment is simply the selective removal of undesirable and competing species of trees to improve the composition, structure, condition, health, and growth of the forest to achieve both wildlife and timber management objectives. Like thinning, FSI may or may not produce income for the landowner and may end up being an investment in his or her time and/or money. The removal of selected trees and shrubs is done with either a chain saw or by injecting with approved herbicides. Following a timber harvest, this tool could be used to treat undesirables that couldn't be sold. One use of FSI is the shaping of the forest mid-story for wildlife benefits. This tool can also be used to deaden large, overmature trees to serve as standing "snags" for long term roosting and cavity use by wildlife. This treatment, along with harvests of undesirable trees for firewood, is a good tool to make major improvements to the forest.

One way that Forest Stand Improvement can yield income for landowners is by cutting undesirable trees for firewood in low quality hardwood forests where these trees cannot be sold as more valuable timber products. Firewood yielded by FSI can be fairly profitable around local rural communities. Care should be taken to avoid "high grading" the forest or woodlot. Only the inferior trees should be taken, leaving the high quality, more valuable trees for future commercial harvests.

Proper spacing of trees is the key to any FSI operation. Trees too closely spaced will soon become crowded, slowing their growth. Trees spaced too far apart waste growing space and encourage larger crowns at the expense of taller, straighter trunks. If both wildlife and timber management are objectives, it may be necessary to compromise between selecting the best trees for wildlife and for timber. An example would be to cut a straight, high quality tulip poplar to give more growing space to poorly-formed oak. A rule of thumb to estimate the best distance between trees in a stand is to measure several trees at a height of 4.5 feet above the ground, a measurement known as "diameter at breast height," or DBH. Multiply this average DBH (in inches) by two and use that number as the distance in feet to leave between trees. For example, if the average tree DBH is 11 inches in diameter, multiply by two for an answer of 22. Twenty-two feet is the proper spacing to leave between that tree and the trunk of its nearest competitor tree. Again, this is only a rule of thumb, and a visit by a professional forester is the best way to evaluate FSI needs.

In addition to leaving high quality trees that are good for both wildlife and timber, trees to leave for wildlife habitat are:

**Den trees -** those with an opening leading into a hollow interior.

**Wolf trees -** those with a short trunk but wide, spreading crown. These are especially important if they produce large amounts of mast (acorns and nuts) and are in an area dominated primarily by small

trees that have not reached mast-producing age. Leave at least one for every two acres.

**Soft mast, fruiting trees -** including hackberry, black cherry, mulberry, black gum and persimmon.

**Hard mast -** attempt to leave some white oaks and red oaks in every stand. Hard mast lasts throughout the winter months when soft mast may no longer be available.

**Down and dead timber -** is responsible for as much as one third of the diversity of wildlife found in the forest. Rotting logs provide habitat for wood decaying insects which is the start of a food chain for a variety of wildlife from woodpeckers, salamanders, and shrews, to raccoons, coyotes, snakes, weasels, and black bears. Hollow logs also provide den sites and escape cover.

The management of large tracts of hardwoods for both wildlife and a sustained yield of forest products can be very complicated and requires professional advice. A landowner in this situation should give serious consideration to employing the services of a qualified professional forester and wildlife biologist. The forester's job is to lend the owner both scientific and financial alternatives based upon the landowner's objectives. This advice should contain a long term plan for the forest. The State of Tennessee's Forestry Division provides forest management planning to forest landowners, which can also be accomplished by employing a private consulting forester. Avoid a "one shot" deal. This caution is to protect the inquiring landowner from enlisting the services of a one-time timber buyer rather than a qualified professional. The wildlife biologist's business is to offer the landowner biological recommendations to meet the landowner's wildlife objectives.

## Pine Forest Management for Wildlife

There are two major types of pine forests that occur in Tennessee, those that are naturally occurring, and those that have been planted. Although the pine tree, in the form of pine plantations, does not foster much love or attention from wildlife enthusiasts, the fact remains that these forests are rich in wildlife throughout the state. Pine forests throughout Tennessee are often industrially managed for pulpwood and sawtimber. They also provide owners with substantial rental payments form sportsmen for hunting rights. Deer and turkey populations respond favorably to well managed disturbances of cutting and prescribed burning in these forests. Pine forests can provide a good diversity of food and cover that wildlife need. In addition, pine seed, at certain times of the year, can be a major supply of food for some species, such as turkey. These types of forests offer excellent opportunities for landowners to receive profitable income while benefitting wildlife.

However, if your objective is wildlife, not all hardwood sites

should not be converted to pine plantations.

On good soils, natural, mature pine forests normally have a mid-story and understory of hardwoods and vines. The owner can manage these forests and woodlots commercially through various harvests and/or thinnings. Where wildlife benefits are concerned, the mid-story and understory of these diverse plants should not be removed. Most natural pine stands have some mix of hardwoods that should be maintained for different food values.

One of the most economical tools of management in pine forests, besides thinning is "prescribed burning." Fire used in a periodic and controlled fashion will encourage succulent plant growth on the forest floor. Pine trees have a very thick protective bark which protects the tree from fire. Prescribed burning requires a certain amount of care and knowledge, may require a permit, and advice should be obtained through the Tennessee Forestry Division. Keep in mind, however, if there is a component of hardwoods in your pine stand, even a controlled burn could damage this very important element of wildlife habitat on your land.

Landowners can increase the wildlife use of these pine stands by developing and planting permanent firelanes (12 feet wide) around woodlots or stands that are to be burned. These planted strips function as firebreaks and supplemental food plots for wildlife. A combination of winter wheat or ryegrass and clover are excellent for planting in these firelanes.

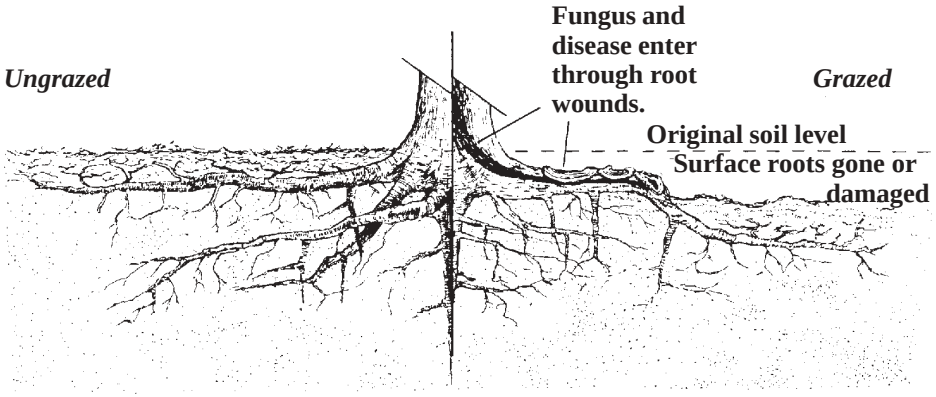
Pine forests that result from planting seedlings (plantations) are normally stocked with over 650 seedlings per acre. This stocking level is intended to discourage encroaching hardwoods from dominating what is intended to be an economical and profitable pine forest in the future. In order for wildlife benefits to be part of the objective on these forests, the landowner must give serious consideration to providing tangible wildlife treatments throughout the life of these stands. When forests are managed for maximum profits, wildlife populations may be severely limited, depending on which species the landowner is managing for. The landowner must view wildlife as one of the products for which the forest management is conducted.

That is not to say that a pine plantation is void of wildlife benefits. On the contrary, the first 5-10 years, new plantations provide extremely important food, cover, and nesting to a variety of wildlife, including deer, turkey, quail, bears, foxes, and may migrating songbirds. However, as the thick pine canopy closes, wildlife benefits diminish because the abundance of fruit and seed bearing plants are crowded out. To increase wildlife benefits, these plantations must be thinned as soon as economically feasible. Wildlife benefits will soon return as the stand becomes more open and mixed. Eventually, through periodic thinnings and prescribed burning, these plantations can be allowed to become more mixed with an understory and mid-story hardwood component. By doing this, commercial forests can once again abound with a diversity of wildlife.

***Ungrazed***

*An obvious "browse line" forms in grazed forests, destroying layers of wildlife habitat.*

*Livestock grazing tramples the soil, exposing tree roots to a variety of damage.*



# Protection From Grazing

The difference between a good wildlife woodland and a poor one may be nothing more than a fence or proper management of the trees. Grazing livestock do serious damage to woodlands. Much of this damage is not immediately visible and shows up only as long-term effects, such as tree decline and loss, soil erosion and compaction, and wildlife habitat destruction.

Tree seedlings and saplings are the first to be eaten or destroyed. Saplings are broken, stripped of bark and trampled. Even large trees suffer wounds from rubbing and the chipping of hooves at the base of the tree.

Livestock hooves mix the leaf litter into the soil, speeding decomposition and exposing bare soil to erosion. The pores in the soil that allow air and water to move down to tree roots are sealed off. Rainwater that should infiltrate into the soil runs off the surface. The fine, hairlike feeder roots located several inches under the ground are exposed and damaged. Trees become weakened and growth rate is slowed. Damaged and exposed tree roots are excellent entry points for insect and disease pests.

The appearance of a grazed woodland changes as trees are harvested or die of old age and there are no young trees to take their place. Often, trees that are more resistant to grazing increase in number as the less resistant, but more valuable, trees are eliminated. Hickories, with their tap root, can tolerate more soil compaction than oaks and will increase in number. Honey locust seedlings are thorny and seldom eaten by livestock and, therefore, thrive in grazed woodlots.

Since there is little else for cattle to eat in the woods, plants are consumed from the ground up to as high as the cattle can reach, creating a browse line. Wildlife needing dense brush and low-growing plants have difficulty surviving in a grazed woodland.

The ability of trees to produce fruit depends on their vigor and health. Grazed woodlands are less vigorous and the trees produce fewer seeds - including acorns, which are a staple food for woodland wildlife. Cattle grazing in a woodlot may eat the entire acorn crop, leaving nothing for wildlife.

Ungrazed forest land provides excellent protection for the soil. In contrast, the soil erosion on a grazed woodland can be as much as 110 times greater than on an ungrazed woodland.

**Influence of Grazing on Erosion Potential In Forest Land**

| | % Ground Cover | Erosion Potential |
|---|---|---|
| Non-grazed | 95+ | Minimal |
| Lightly grazed | 85-95% | 8 times |
| Moderately grazed | 50-85% | 30 times |
| Heavily grazed | 0-50% | 110 times |

Hardwood forests produce poor-quality forage for livestock. One acre of a managed pasture is worth from 20 to 40 acres of woodlands in grazing value. The best investment is to manage existing pasture land and allow the woodlands to grow trees and wildlife.

To return a grazed woodland to good wildlife habitat, fence out the livestock. Small potions of the forest edge can be made available for cattle shading, while protecting the rest of the forest. Check with the local NRCS and FSA Offices for possible cost-share programs to help offset fencing costs.

**Streamside Management Zones**

Good forest management should consider "Streamside Management Zones" (SMZs) to protect water quality. Any watercourse running through the wooded portion of the property should be protected by leaving a substantial amount of trees along it. It is best to dedicate a zone of at least 150 feet from either bank where very limited management takes place. More is better. These low impact areas will filter from erosion and help maintain good water quality for your property and your neighbors. These SMZs also serve as a diverse habitat type for wildlife through mast production, den trees, travel corridors, nesting habitat, and hunting sites.

Forest management, if not done properly, can have significant negative impacts on fish populations in streams and creeks that transverse your property. Changes in water quality, such as increases in temperature or turbidity, generally favor less desirable fish species such as chubs, minnows, and suckers, over those forest stream fish that you desire such as smallmouth bass, rock bass, sunfish, and other sport fish. This is also true of forage fish that are food for the predatory fish.

SMZs should remain in hardwoods. Converting hardwood stands to pine stands also can be detrimental to stream fishery populations. Streams have evolved with the energy source common to the watershed and this source helps determine the fisheries community in the water. Predominant hardwood or mixed hardwood forests should not be converted to pine since pine input (pine needles, branches, dead trees) into streams requires different processes to break it down into a useful energy form which can be utilized by the resident fish population. Studies have shown a net energy loss to a stream system resulting from these conversions.

Road construction should be kept to the minimal necessary to access the timber and kept open only as long as is absolutely necessary to transport the timber out of the area. Stream crossings should be as few as possible and only where needed. Heavy equipment use in SMZs should be eliminated if possible.

In addition, in-stream habitat should not be degraded by gravel removal from the stream itself, even if the removal constitutes a short-term economic gain. By taking all of the above recommenda-

tions into consideration when managing your forest, only marginal impacts will occur to your fishery resources present in your stream or creek.

**Protecting Snags and Den Trees**

A snag is a standing dead tree. Den trees are live trees with a natural hollow in the trunk or limbs. Both are essential habitat for many kinds of woodland wildlife.

Once a tree dies, the slow process of decay begins. As the heartwood in a snag softens, woodpeckers excavate nest holes, which are later used by other wildlife.

Many birds, mammals and reptiles use tree cavities throughout the year for nesting, feeding, perching, escape cover and protection from the weather. Fewer or no den trees usually means less wildlife in an area.

In a typical woodlot, trees with cavities are often in short supply, so it is important to protect both existing and potential den trees. Old, open-grown, large-crowned trees should be protected, because they are likely to become good den trees. They also produce nuts, seeds and fruits, making them doubly valuable for wildlife.

White oak, post oak and other members of the long-lived white oak group make the best den trees, but black oak, red oak, hickory, American elm, sugar maple, American sycamore, eastern cottonwood, black gum, ash and basswood are also excellent.

As a general rule, seven snags or living den trees per acre provide an adequate number of cavities.

Live den trees will last longer and are often fruit or nut producers. Standing dead trees attract insects and do not compete with other trees for water, nutrients and sunlight. Consider the option of deadening undesirable trees but not removing them.

A woodland management plan for wildlife should include the following practices for protecting snags and den trees within a woodlot:

- Leave at least one snag and one den tree larger than 20 inches at DBH for every acre of woodlot.
- Leave at least four snags ranging between 10 and 20 inches at DBH per acre.
- Leave at least two snags and two den trees ranging between 6 and 10 inches at DBH.
- Preserving existing snags and den trees, and protecting potential den trees, helps the woodlot become a productive wildlife area for many years to come.
- Den trees and snags can be created by wounding selected trees. Open wounds allow fungi to enter the tree and begin the decay process. It may take several years for trees to develop cavities. This process can be hastened through the following techniques:

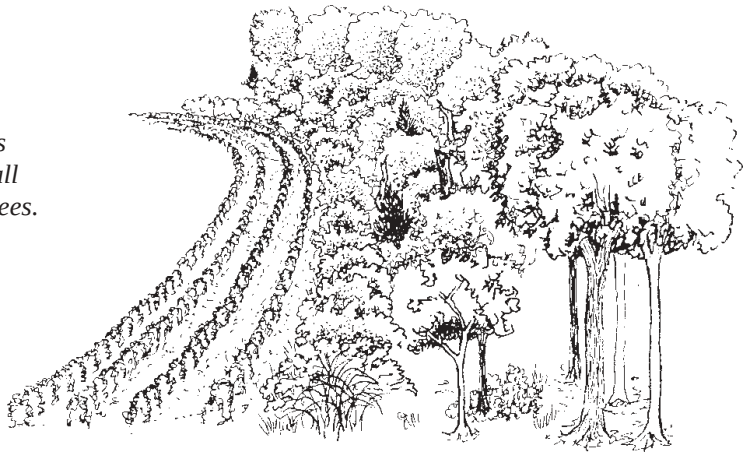
- Cut a limb (the larger the better) about 6 inches from the trunk of the tree. Ash, elm, cottonwood, sycamore, silver maple and basswood are especially prone to develop natural cavities from cuts.
- Chop a section of bark from the trunk of a suitable tree, preferably one that already shows signs of damage or decay. Select trees at about 100-foot intervals.
- Drill a hole, at least 2 inches in diameter and 3 inches deep, into the trunk of a tree. If possible, make the hole under a limb that is 3 inches or more in diameter.
- For more immediate results, put up bird houses and den boxes.

## Woodland Edges And Openings

Edge is the transition zone between habitat types. This zone offers critical wildlife food and cover. The amount, diversity and quality of the edge directly affects wildlife populations.

High-quality edge is a wide band of plants that gradually changes from one cover type to another. It has grasses, weeds, shrubs, vines and small trees that provide wildlife foods such as berries, seeds, browses and insects. It also offers cover for nesting and protection from weather and predators.

Good edges usually require deliberate action on the part of the landowner. High-quality woodland edge can be created by planting shrubs or small trees in a 30-foot or wider strip at the edge of the field. Another option is to allow the border to naturally revert to native plants, and supplement with plantings if necessary. The natural process is usually rapid and reliable after the elimination of grazing, plowing and mowing. Conversion of heavy sod, such as fescue, to edge habitat can be hastened by plowing, disking, or applying herbicide to the border strip, which allows native species to



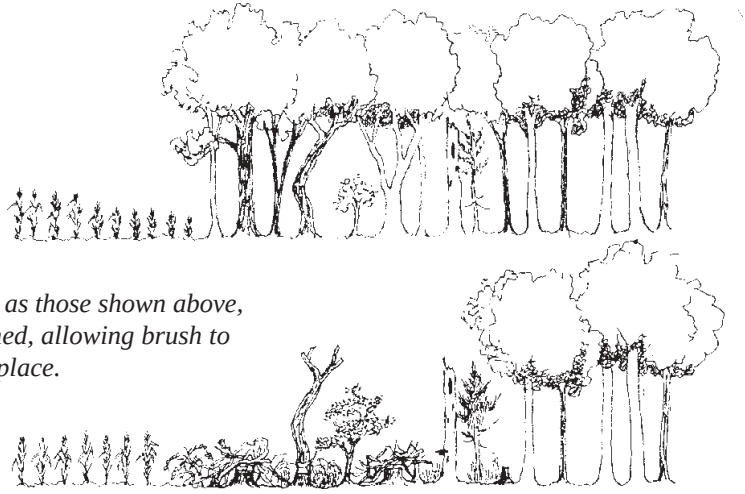
*An ideal edge has crops, brush, small trees and large trees.*

invade. Consult a Tennessee Wildlife Resources Agency biologist for proper selection of herbicides to achieve your habitat goals.

Some crop field acreage is considered too valuable to remove from production. An alternative in such areas is to create edge in the woodlot by removing some trees.

If a field is bordered by trees that affect the growth of crops along the edge, it may actually be cost efficient to let an edge develop between the trees and the field. This is true because the return from low-yield field edges may not offset the cost of seed, fertilizer and site preparation.

Large trees of low commercial value within 30 feet of the crop field should be removed for firewood or deadened to allow sunlight to reach the smaller shrubs. Within 15 feet of the crop field, small trees such as dogwoods, hawthorns, plums and red cedars should also be cut. Some trees should be cut low so that sprouting will occur



*Large trees, such as those shown above, should be deadened, allowing brush to come up in their place.*

at ground level. Vines attached to trees should not be cut when felling the tree.

Large woodland tracts can lack the variety of plants necessary to support diverse wildlife populations. A one-acre opening in a forest often provides as much as 10 times the amount of plants used by wildlife as one acre of mature timber. Annual weeds, grasses and seedlings found in these openings produce food, nesting sites and escape cover for wildlife.

Five to 10 acres of small clearings per 100 acres of woods is desirable. These openings should range from 1 to 3 acres in size. Smaller woodlots surrounded by pastures and farm fields will reduce the need for forest openings. On larger woodlands, open space is provided by roads, utility rights-of-way, log landings, or small clearcuts.

## Logging Roads and Logging Decks

Logging Roads and logging decks are possible sources for erosion. However, they are also excellent opportunities for green forage for wildlife. When a logging operation is complete, logging roads and logging decks should be disced, limed, and fertilized as needed, and sowed. This should be done immediately to minimize erosion, improve water quality, and provide food for wildlife. In late summer and fall or early spring, sow a mixture of winter wheat and ladino clover. In late spring/early summer, sow summer rye or winter wheat. Clover should be oversown into the rye or wheat that fall. Daylighting logging roads can improve the quality and quantity of a linear food plot and the use of the roads. Daylight the roads by clearing 8-15 feet on either side of the road. This allows the sun to dry the road and allows the roadside to grow green forage. Because logging roads and logging decks are usually found throughout the forest, converting them to food plots can benefit wildlife throughout the forest. Log decks often have brush piles and cull log piles lift after harvest. **Do not burn these!** These debris piles are covered as they age by polkweed, blackberries, and vines and may last more than 20 years. They provide escape, denning, and feeding cover for many species of wildlife including raccoons, bobcats, mink, groundhogs, songbirds, and small mammals.

## Woodland Management Tips:

- ✓ Protect woodlands from grazing.
- ✓ Deaden large trees along woodlot edge.
- ✓ Plant 30-foot wide strip of shrubs along mature woodland edge.
- ✓ Use root plow to reduce competition along woodlands next to crop fields.
- ✓ Create small openings within large timber blocks.
- ✓ Encourage vines and fruiting shrubs.
- ✓ Apply Forest Stand Improvement practices.
- ✓ Don’t cut den trees and snags.
- ✓ Leave brush piles from firewood cutting.
- ✓ Install squirrel den boxes.
- ✓ Fence a 100-foot wide zone along all wooded streambanks to exclude livestock. Stop all cutting and mechanical activities in this area.
- ✓ Always use Best Management Practices during all forest management activities.
- ✓ Sow logging decks and logging roads for erosion control and wildlife food plots

CHAPTER 6

# *Idle Area Management*

Nearly every farm has some land that is unsuitable for cultivation, grazing or haying due to its steepness of slope, soil type, wetness or small size. These idle areas - old fields, abandoned house sites, pond edges, wetlands, stream banks or corridors, bushy draws, ditch banks, erosive areas, and even your lawn provide wildlife habitat diversity and can be useful to wildlife. With a little management, they can provide wildlife food, sites for nesting and brood rearing, and protection.

This chapter contains information on developing idle land or "odd areas" for wildlife.

## Old Fields

Abandoned pastures and crop fields can provide excellent wildlife habitat, but you may feel inclined or pressured to "clean these areas up to make them look better". While a few trails will make them more accessible for you, "bush hogging" large areas will simply destroy the seed and fruit producing plants that several animals depend upon for food and cover. These areas naturally produce plants such as goldenrod, wild aster, strawberry, ragweed, blackberry, sumac, coral berry, persimmon, sassafras, wild plum and red cedar. All of these plants provide some food and protection during the year for several species of wildlife. Many songbirds use wild plum and other low growing shrubs for nesting, and quail use them for escape cover and deer browse on their twigs.

Old fields are in the early stages of plant succession, the natural process by which an area passes from bare ground to the most complex or "climax" stage of vegetation. The earlier stages are more productive for wildlife such as quail, rabbit, and many songbird species. Occasional soil disturbance is good in these areas, otherwise, the "old field" tends to revert to forest. Some bare ground is important. Studies show that most quail nests are located within a few feet of bare ground. The hen quail will move her chicks immediately after hatching to bare ground in search of insects and grit.

The first year following disturbance, pioneer species, such as ragweed, partridge pea, and beggarweed tend to proliferate and

attract many insects. These provide a critical food source for nesting hens and young chicks of ground-nesting birds. This first year stage provides a lot of bare ground and is optimum brood habitat. The second year after disturbance, grasses become more dominant. The previous year's dead grass leaves are often used by quail and other ground nesters for nest construction. The third year after disturbance, blackberries, goldenrod, and woody tree seedlings tend to invade. Some of these species are important food sources and provide protective cover. However, if plant succession is allowed to continue unabated by burning or disking, many woody species can become management obstacles to old field management, and wildlife dependent on old field habitat will decline.

Productive stages of old fields can be encouraged by using some of the following techniques:

## Fescue Eradication

Tall fescue can inhibit the growth of other plants, and it provides little food or cover of value to wildlife. Fescue can become so thick in old fields that is inhibits travel by some wildlife. Use a herbicide to kill any fescue in old fields. Using selective herbicides, native grasses and legumes will often be released from suppression once the fescue is eliminated and will quickly re-establish naturally without planting. Consult with a Tennessee Wildlife Resources Agency biologist regarding the proper selection of herbicides to achieve your habitat goals.

## Prescribed Burning

Prescribed burning (as opposed to uncontrolled wildfire) is typically the cheapest and most effective means of maintaining an old field in a desirable complex of native grasses, legumes, and other beneficial wildlife plants. It is best to set up a three-year rotation of prescribed burns to achieve a mosaic of first, second, and third-year habitats. It is ideal to set up an alternating pattern of blocks of seven (7) acres or less in size; however, larger blocks may be necessary depending on the size of your property and available manpower.

Be sure to disk a firebreak or have a cool season grass/legume firebreak around areas you do not want to burn. Timing of your burns is important. Burning is usually done from February to early April. Burns in early in this period tend to favor stimulation of forbs and legumes, while later burns tend to favor production of native warm season grasses. You may want to consider burning several times to achieve a more diverse plant community. Even later burns may also be possible, for example, on areas of fescue which have been killed by herbiciding. A hot, summer burn may be necessary to kill woody species. (A permit from the Forestry Division may be required.)

Because burning can be potentially dangerous if not used properly, if you are not experienced and/or trained in prescribed burning, it is recommended you seek the guidance or services of a competent professional, or consider alternative management methods. At times, Tennessee Forestry Division personnel can be hired to conduct a complete prescribed burn on private land. Occasionally, assistance can be provided by Tennessee Wildlife Resources Agency biologists, if they are involved in a comprehensive wildlife management plan on your property. Other trained consultants may also be available in your area.

### Disking

Disking is the next preferred alternative for setting back succession in old fields. You can either set up a pattern of small blocks to be disced on a rotation as described for prescribed burning, or a pattern of strip disking can be used. When strip disking, disk a 50 foot strip, (on the contour, if the land is sloping), and leave a 100 foot strip undisced before your next disced strip. In subsequent years, disk a 50 foot strip adjacent to the ones disced the prior year. In this pattern, every piece of land is disced once every three years.

## Abandoned House Sites

The shrubs, lawn grasses, fruit trees and weeds found around old home sites are beneficial to wildlife. The stately old trees, with their many cavities and high production of nuts, fruits and seeds, are attractive to squirrels, rabbits, quail, deer and songbirds. Old concrete and rock foundations attract groundhogs, whose burrows provide homes and cover for rabbits, raccoons and red foxes. Lawn grasses and shrubs are eaten by deer. Grasshoppers and other insects found around these sites are food for quail and turkey broods.

Old house sites can be improved by building brush piles and old placing lumber on the old house or barn foundations for wildlife cover. Fruit bearing shrubs and trees - such as walnuts, dogwood, black cherry, crabapple, hawthorn, persimmon, and wild plum - can be planted. Mow strips around and through the lot to stimulate new growth of grasses and legumes. Early spring or early fall is the best time for mowing. Be careful not mow too much of the area.

## Glades and Balds

Glades and balds are rocky openings of various sizes in forested areas. Glade features include exposed bedrock, prairie grasses and wildflowers. They are more common in the middle of Tennessee and are usually found on the south or west sides of slopes, but can occur

on any aspect. Glades occur on almost any type of bedrock, including limestone, sandstone, igneous, and dolomite and can be as small as 1/4 acre or cover hundreds of acres in some instances.

Glades are home to many uncommon animals such as collared lizards and eastern narrowmouth toads. Some of the more common glade animals are speckled king snakes, fence lizards, and six-lined race runners. In middle Tennessee, glades are home to endangered plants such as Tennessee coneflower. A healthy glade will frequently have more than 100 species of plants.

Many glades under private ownership are now covered with Eastern red cedar trees, as a result of continuous grazing by livestock and the lack of fires that controlled the invasion of cedar. With a little work, a landowner can restore a glade to its relatively open condition, making it more valuable to the wildlife that call it home. A glade with no or few cedars and a good variety of plants should be protected from extensive grazing. The glade will remain in good condition with nothing more than an occasional prescribed burn. Areas with extensive cedar growth will require the use of a chain saw. The cedars can be dropped and allowed to cure for about a year when they can then be burned. The burning of several cedars can produce an impressive fire. Extreme care and extensive planning should be done before under taking this activity. Contact the Tennessee Forestry Division or Tennessee Wildlife Resources Agency wildlife biologist for guidance concerning the use of prescribed fire.

## Pond Areas

Pond areas can be developed according to what you and your family enjoy. A pond site can be developed for wildlife habitat, for fishing, or for other types of recreation. Trees and shrubs may be planted around the pond for protection and cover. Windbreaks help check wave erosion and provide food and nesting areas for wildlife. To avoid damage to the dam by root penetration, do not plant trees on the dam. They should also be planted far enough from the shore so that they do not interfere with fishing.

Newly constructed ponds should be stocked with bluegills, bass, and catfish. Bluegills and bass are available for stocking new ponds or renovated ponds (in which all fish are removed) through the Tennessee Wildlife Resources Agency. Technical assistance for the proper management of small ponds is available the publication "Management of Small Ponds and Lakes in Tennessee" or from Agency fisheries biologists.

All ponds are used at times by wildlife. By locating the pond near good wildlife cover, or by developing good cover around the pond, and limiting or excluding livestock use, a landowner can increase this use. If the watershed is grazed, fencing off an area around the

pond that is 1 to 1 ½ times the water acreage permits the development of ideal wildlife cover. The larger the area, the more attractive it will be to song birds, furbearers, deer and wild turkeys. Livestock can still be provided water from the pond using a gravity-fed water trough or other alternative water source.

## Stream Banks or Riparian Corridors

Trees and shrubs that grow along streams (the riparian corridor) provide an important wildlife habitat component. Several wildlife species depend on riparian woodlands for all or part of their habitat needs. Some species spend their entire lives within this zone.

In the crop farming regions of Tennessee, a strip of riparian woodland may be the only woody cover to be found on the farm. In heavily forested portions of Tennessee, the forest cover could include the stream bottom. The kinds of trees that grow in the stream bottom, however, are different from those on the adjoining slopes. This makes riparian woodlands unique. The water and the variety of trees, shrubs and other plants, make riparian woodlands important to wildlife.

The riparian woodland should be at least 100 feet wide on each side of the stream. Where the riparian strip is very narrow or nonexistent, you can improve it by spreading seeds from nearby trees and shrubs. Cottonwoods, green ash, silver maple, willows, sycamore, elm, sweetgum and yellow poplar have light, windborne seeds that will germinate if they land on bare soil. A herbicide can be used to kill the tall fescue within these areas. Trees such as pin oak, willow oak, pecan, black walnut, cottonwood, sycamore, yellow poplar, river birch and sweetgum can be successfully grown from seedlings. Many of these trees make excellent cavity trees at maturity. A mixture of these trees is ideal because some will grow fast (cottonwood and sycamore) and provide cavities earlier. Slower-growing, long-lived trees (sugar maple or swamp white oak) will replace the faster growing trees in later years. Tree seedlings must be mulched with straw or sawdust to conserve moisture and reduce grass competition.

Don't remove trees that have fallen into the stream or appear ready to do so. The tree and shrub roots are keeping the bank from eroding. When a tree eventually falls, it creates important instream habitat for fish and other aquatic life. Trees that are causing problems in the stream can be removed, but never use heavy equipment to dredge the stream channel or to alter the stream bank.

Livestock that graze along stream banks destroy trees and shrubs and cause stream bank erosion. Fence cattle away from stream banks. If protected from livestock, these areas will often revegetate without planting. Where access to water is needed, cattle can be restricted to one watering area to reduce potential erosion. Plans for

allowing cattle to water in streams with little impact to the stream are available from the NRCS.

## Brushy Draws

Brushy draws that extend well into crop or hay fields can provide quality habitat for wildlife and help control soil erosion. A brushy draw should contain vines, brush and grasses and only an occasional large tree.

Livestock should be fenced out or excluded from these draws. Cattle can quickly destroy the low growing shrubs important to wildlife as sources of food and cover.

Brush piles can be constructed along the edges and at the head of the draws. To avoid clogging the drainage, don't place the brushpile in the bottom of the draw.

Brushy draws can be maintained and renovated with prescribed fires.

## Springs, seeps and fens

Springs, seeps and fens (upland marsh) are found throughout Tennessee, but are more common in the eastern half of the state. These are unique, valuable areas for wildlife. Many rare and endangered species, including orchids and the federally endangered bog turtle, are associated with these unique sites. These areas should be protected from livestock. They are fragile and subject to erosion, when livestock are allowed access. If water for wildlife or livestock is a limiting factor on the farm, water holes should be constructed on other, more suitable sites.

## Erosive Areas

Certain field areas will erode more than others, depending on the soil type, steepness of slope, and land use. Erosion-prone land can be seeded to various plants that will benefit wildlife and help save the soil.

Select a good seed mixture appropriate to the soil type and location (see Chapter 10 for seeding mixtures). Wildlife prefer a legume and grass mixture to a single seeding of fescue. Lightly disk or rake the area to expose some bare soil for a seed bed. Broadcast the seed mixture and then spread three bales of wheat straw mulch for each 1,000 square feet of area.

A cutting of hay may be possible after a few years. Cut hay only once a year, leaving about 6 inches of stubble. Cut hay in alternating strips every other year to keep the plants growing vigorously. This will provide nesting sites as well as food and cover for wildlife.

## Fencerows

A brushy fencerow can provide an important connecting link between different habitat types on the farm and is an ideal place to start habitat improvement work. The simplest way to make or improve a travel lane is to stop mowing, grazing, or cultivating the strip next to the fence. On farms with heavy grazing, install a double-fence to protect a travel lane. An electric fence is effective and inexpensive for this purpose, but it must be maintained in good repair.

If some of the larger trees in a fencerow are cut for firewood, the tops can be piled as brushpiles (see Chapter 10, brushpile construction). If the fencerow is bare or less than 20 feet wide, plant shrubs such as dogwood, wild plum, grape, indigo bush and blackberries to improve the cover. Plowing and heavy disking will reduce grass competition and create a seedbed where seeds of these shrubs (persimmon, redbud, sumac, hazelnut, viburnum, etc.) and trees (oaks, mulberry, cherry, pin oak, dogwood, etc.) could be planted. If tall fescue is growing in this area, a herbicide will have to be applied to reduce the competition of this aggressive grass. Tree seedlings must be mulched with sawdust or straw to conserve moisture and reduce grass competition. Other native plants will be added through bird droppings.

## Idle Area Management Tips:

- ✓ Disk strips on the contour to encourage weed seed production.
- ✓ Mow alternate strips, but protect woody vegetation.
- ✓ Hinge-cut cedars and cull trees (locust, elm, etc.) for quick cover.
- ✓ Plant annual grain food plots.
- ✓ Plant grasses and legumes around brush piles and in brushy draws.
- ✓ Fence to protect pond areas.
- ✓ Fence to protect stream banks.
- ✓ Fence to protect woody, brushy draws.
- ✓ Develop wildlife watering holes.
- ✓ Protect springs, seeps and fens from livestock
- ✓ Plant grasses and legumes on eroding area.
- ✓ Protect fencerows for cover and travel lanes.
- ✓ Use herbicide to kill tall fescue to release native grasses and allow seed producing weeds and legumes to grow.
- ✓ Burn small grassy-weedy areas at different times and intervals to create plant diversity.

CHAPTER 7

# *Wetland Management*

**W**etlands mean different things to different individuals. Some people envision a dark, dreary swamp; others a place to enjoy an early morning duck hunt, or an afternoon of wildlife watching.

By definition, a wetland is a tract of land containing much soil moisture that supports certain types of water-tolerant vegetation. Lands that fit this description can vary from permanently flooded sloughs to areas that have only saturated soil during part of the year.

Wetlands function as biological filters that remove sediments and pollutants from surface waters. They also act as natural sponges, reducing flood severity by slowly discharging excess water back into the stream or groundwater table.

Wetlands are biologically rich, with a greater diversity of plants and animals than is found in drier habitats. They are excellent habitat for all kinds of waterfowl, reptiles, amphibians, furbearers, shorebirds and songbirds. Natural wetlands along streams and rivers are important as fish spawning and rearing areas.

Historically, natural wetlands dominated the floodplains and river deltas in Tennessee. It is estimated that in the 1780's there were around 1,937,000 acres of wetlands in Tennessee. As late as the 1950's, Tennessee had 447,600 acres of high quality wetlands for waterfowl habitat, which was the sixth greatest tot of high quality wetlands in the United States. The wetlands were not evenly distributed, as over 80% of the wetlands occur in West Tennessee along the river floodplains. These areas are also prime agricultural lands, and primarily because of agricultural development and flood control practices, only about 787,000 acres of wetlands remained by the mid-1980's. As we look toward the future, we realize how important it is to preserve our few remaining natural wetlands and to develop new wetlands wherever possible.

Many of the wetlands in Tennessee today are "developed" - that is, they were constructed on previously dry or seasonally flooded land and are maintained by terraces and water-control devices. For information on construction and development of private wetlands (see Chapter 10, Developing a Wetland.)

**M**ost wetland management today is directed toward creating good waterfowl habitat. In this type of management, waterfowl food production is a primary concern. However, the needs of other wetland-dependent wildlife (e.g., shorebirds, amphibians, wading birds) are becoming an increasingly important component of wetland management strategies.

Wetlands should only be developed above the one-year flood plain. Levees, terraces, and water control structures should not be constructed in areas which flood annually. In such areas, the natural hydrologic cycles of winter flooding and summer drying should be allowed to function unimpeded. Avoiding the annual floodplain will greatly increase the chances of a successful project and protects the integrity of the natural floodplain.

Diverse groups of plants grow naturally on moist or wet soil; these plants produce seeds that contain essential nutrients for waterfowl. They also provide excellent growing conditions for invertebrates, such as small snails, clams, and insects, which are good waterfowl foods. Wetland management techniques encourage the growth of these moist-soil plants. In many cases, domestic grains are planted and then flooded for supplemental food. A combination of natural, moist-soil plants along with row crops is best for waterfowl.

Following are some procedures that produce many kinds of waterfowl foods, both natural and cultivated, under a variety of wetland conditions.

## Legal Issues

All landowners should be aware that wetlands are regulated by law and cannot be modified without a permit from the U.S. Army Corps of Engineers. These modifications also include any alterations of hydrology.

## Flooded Fields

On developed wetlands, moist-soil plants are encouraged by flooding the fields in winter and drawing the water from the fields during the growing season. This allows germination of the seeds that are naturally present, such as sprangletop, smartweed, wild millet, barnyard grass, sedges, and beggarticks.

The timing and rate of the drawdown are important for good plant growth. Although there is no set method for determining the best time to draw down a wetland, a general recommendation is that the water be held on the wetland until late spring (May through June) which mimics natural climatic cycles; the drawdown is then begun by opening the water control structure. The rate of the drawdown should be slow enough to prevent rapid drying of the soil. This will discourage undesirable species while stimulating desirable moist soil plants. The wetland is then reflooded in the fall to make these foods available for waterfowl. A slow, progressive reflooding of the marsh is best, starting around the first of September for wood ducks and teal, or the first of November for many other wetland species. Use of water level control techniques should be limited to those areas which can be drained by May-June each year.

## Flooded Cropland

Flooded grain crops can be very beneficial for waterfowl, especially late in the winter when the weather is extremely cold. Corn or grain sorghum should be flooded from October 15 to March 30. Crops planted specifically for waterfowl need not be clean-tilled because the weeds will provide additional food. Japanese millet can

also be sown (15 pounds per acre) to supplement the cultivated crops. Japanese millet can be sown on mud flats as late as mid July and a seed crop will be produced before Fall flooding.

## Flooded Timber

Bottomland forests are an important wetland habitat type. The management plan for a bottomland forest should protect the health of the trees; therefore, no flooding should occur during the growing season. Flooding dates, depths and duration should vary from year to year to maintain the productivity of the forest. In Tennessee, a forested wetland usually can be flooded from October 15 to February 15. The water should be drained before leaf-out of the trees. A slow drawdown is better than a rapid one, since more preferred plants will be produced. Open areas in the forest can be planted to Japanese millet or managed for natural foods.

Bottomland hardwoods which flood naturally should be left to do so on their own. Building terraces with the intention of holding winter water creates too great a risk of holding water through the growing season. Permanent flooding will kill timber in just a few years. The construction of terraces and flood control structures in bottomland hardwoods should be avoided to prevent damage to valuable timber.

## Temporary Wetland Pools

Temporary or ephemeral pools are important breeding sites for frogs and salamanders and are also used by other wildlife such as reptiles, migrating shorebirds and waterfowl and many types of insects. These pools are important because they provide breeding habitat free of predators such as fish and bullfrogs. These predators will eat the eggs and young of amphibians. Since the time of settlement there has been a marked decrease in temporary wetlands and they have been replaced by permanent ponds.

While most of Tennessee's amphibians are spring breeders, there are a few salamanders which breed in the fall. Some of the common species which use these areas are western chorus frogs, spring peepers, southern leopard frogs and tiger salamanders.

To select a site for your pool, you should look for natural low spots or dips in the landscape that may hold water for short periods of time, particularly during the spring. These sites can occur almost anywhere, on flood plains, uplands, forests, fields, or pastures. These areas may already have wetland plants such as smartweed and sedges. If the site holds water for 2 or 3 months, there is a good chance it is already being used and shouldn't be disturbed. Areas on flood plains are especially attractive since they will fill up during floods.

A small pool can be constructed in less than a day using a small

bulldozer or a tractor and blade. A depth of one to two feet is ideal and the pool should have sloping sides. Pools can be of almost any size or shape depending on the site. Trees around the site should be left in place.

Once the pool is constructed, there is usually no need to introduce aquatic plants or animals. The soil in a seasonally wet area will frequently have a seed bank of wetland plants and animals are good at finding wetlands on their own. If plants are introduced, care should be taken not to use aggressive species such as cattails or purple loosestrife.

If done correctly, your pool will dry up during the hottest part of the summer and fill up again in the fall or spring, just in time for the next breeding season.

## Natural Sloughs and Small Ponds

Most natural sloughs and small ponds function very well without any intervention. In most cases, do not attempt to manipulate water levels, simply allow them to fluctuate naturally.

If draining the pond or lake is possible, it can be drawn down 1-2 feet in early June to encourage beneficial plants, then allowed to refill with rainfall and runoff. Mudflats around ponds can be seeded to Japanese millet.

If water control is possible, sloughs can be managed as described above. If not, the following techniques can be used where feasible:

- Plant food and cover strips and encourage native plants along edges of wetland.
- Plant bottom-rooted plants, such as duck potato, in shallow water areas.
- Plant pin oaks or other beneficial trees along the water's edge.
- Control bottom-feeding fish to allow aquatic plants and insects to thrive.

## Wetland Management Tips:

Nesting structures for wood ducks can be constructed from the plans shown in Chapter 10.

✓ These nest boxes can be installed in wetlands and along streams.
✓ Nest boxes should be placed where quality brood rearing habitat exists.
✓ Technical assistance with private wetland development and management is available from field staff with the TWRA, NRCS, and Ducks Unlimited.
✓ Leave border strips of tall vegetation around wetlands
✓ Create small temporary ponds which dry up in the summer
✓ Do not allow standing water on bottomland hardwoods during the summer

CHAPTER 8

# *Species Management*

This chapter describes habitat management techniques for several species (quail, cottontail rabbit, turkey, deer, and squirrel) as well as two groups of species (waterfowl and non-game species)

Most of the management practices recommended for these species will also benefit more than a single species. Frogs, salamanders, mink, raccoons, and turtles, which are essential to the balance of nature, may benefit from waterfowl management practices. Songbirds, lizards, and owls may benefit from rabbit management practices. Good wildlife habitat can support many species.

## Bobwhite Quail

Bobwhite quail are best managed on a 20 to 40 acre basis. This area is small enough to work with and large enough for a covey of quail. Smaller acreages can still be valuable for quail if elements of habitat can be provided which are missing on adjacent properties.

### Food Management

Bobwhite quail are primarily seed eaters. However, insects are a crucial food item for nesting hens and young chicks. Their diet varies over the state. In grain-producing areas, where natural foods may be very limited, soybeans are the most popular quail food, followed by corn, weed seeds and milo. In other areas quail rely heavily on weed seeds, but will eat small-grain crop residues when available. Fall plowing eliminates crop residues if fields are turned under. This practice should be avoided.

A quail food management plan should provide these three primary sources of food: 1 ) crop residues (waste grain and legumes); 2) native weed and grass seeds, and shrub and tree fruits; and 3) special plantings of grain (see Annual Grain Plots, Chapter 10).

It is essential that food be available close to escape cover. Quail should be able to walk through good cover to their feeding grounds.

## Important Food Plants For Quail:

Acorns, asters, bedstraws, beggar ticks, blackberry, cinquefoil, clovers, crop residues (corn, milo, sunflower, soybean), dandelion, foxtails, goldenrods, grapes, kobe or Korean lespedeza, poison ivy, ragweeds, sedges, smartweeds, pannicums, Johnsongrass, violets, black cherry, sassafras, cowpeas, buckwheat, partridge peas, shrub lespedeza (bicolor, VA-70, AMQuail).

## Cover Management

The most obvious cover management for quail is to protect what is already there, the shrubby and woody edges, draws and "waste areas" that usually occur around a farm. Cover can often be improved simply by fencing livestock out to allow natural plant growth. Scattered patches and travel lanes of dense, brushy cover should be maintained throughout each 40 acres. Eradicate any existing fescue and allow to regrow in native grasses and weeds. Not all cover is created equal. Quail need different types of vegetative cover.

**Nesting cover -** Good nesting cover is most often located in unmown or ungrazed old field areas, or in field borders with redtop, timothy, orchard grass, perennial rye grass, broomsedge, or mixtures of native warm season grasses. Broomsedge fields are also ideal. Fescue must not be the dominate grass or nesting quality will be poor.

**Brood cover -** Young quail chicks have a difficult time maneuvering through thick vegetation. The best brood cover is broomsedge or little bluestem which grows in clumps with bare ground around the clumps. These grasses grow to a height of about 24-30 inches. One or two year old fallow fields also provide excellent brood cover.

**Roosting cover -** Quail roost in vegetation that is not too dense, but still provides concealment from above. The roost is usually in open, "clumpy'' vegetation away from thick or tangled escape cover. Idle fields of ragweed, broomsedge, big bluestem or Indiangrass are good roosting areas.

**Escape cover -** This important element can be provided by brush piles made from branches left over after firewood cutting, brush thinning or tree trimming. This cover improves with time as vines, briars, and annual weeds grow over the brush, improving security for quail. Several loose piles located next to food production areas are best. Consider an area to be suitable escape cover if you can't walk through it or see through it. Ideal escape cover is woody thickets of

sumac, cedars, and other cover with honeysuckle and briars. It is essential for quail survival from predators. No matter how plentiful the food, without good escape cover, quail will not flourish.

## Disturbing the Soil

Disking is used to change the composition of plants within the bobwhite quail range. The removal of strips of sod-forming grasses such as bluegrass and fescue will make room for the seed producing plants that are important to quail. This technique can be applied to old fields, where the vegetation has grown into a stagnated condition that provides less diversity of plants. If fescue is the major component of the grass composition, however, disking may only enhance the fescue production. In this situation, a herbicide must be used to kill the tall fescue in addition to disking. Disking and herbiciding fescue in the fall works best.

Fallow crop fields that have produced tall weeds for a couple of years can be made more accessible for quail broods by disking from December to April. The shorter vegetation that is produced after disking, will produce insects that are also important for quail chicks. Disking strips in alternate years will add to the field's diversity and prolong its usefulness for quail and other wildlife that utilize this habitat component.

Studies have shown that disking in winter (December) produces heavy-seeded quail foods such as ragweed and partridge pea while the peak production of important grass seed results from disking later in the spring (April). June disking produces more of the plants that attract insects, plus a number of major seed plants that are important seed-producers for quail (beggerweed, etc.). An area managed for quail should have a mixture of these treatments in order to produce the variety of plants that are used for cover and food. The disced strips in an old field or fallow field must be redisced every few years to keep the food plants from being crowded out by the less-desirable vegetation.

## Prescribed Burning

The most economical, useful tool for anyone wishing to manage quail in the wild is prescribed burning. The removal of litter makes quail food easier to find. Important plant seeds scarified by the heat will germinate much better on the burned-over range while the new sprouts will furnish insects in spring and summer. The kinds of invertebrates that parasitize quail are actually decreased by fire. Furthermore, careful burning releases the ash and minerals tied up in vegetation and stimulates the building of nitrogen in the soil. The result is a fertilizer effect for plants that are beneficial for quail. In addition, prescribed burning helps set back woody vegetation and

helps maintain a desirable stage of vegetative growth, promoting a new growth of grasses and annual seed producing forbes.

Fire is a management tool that can be either used to an advantage or abused to become a negative factor in habitat management. Before fire is used, the manager must become aware of both the negative and positive aspects of fire within the habitats that are being managed. Factors that must be considered are: 1) the time of the burn — early spring, late spring, summer, fall, etc., 2) the type of burn — head fire, backing fire, etc., 3) conditions of the burn — wind, moisture, etc. 4) type of fuel — grassy, shrubby, etc., 5) fire control methods — green lines, plowed lines, mowed lines, etc. Valuable information concerning the use of fire and the methods through which it can be applied to a particular habitat situation can be obtained by contacting the Tennessee Wildlife Resources Agency, Tennessee Department of Forestry, or the Natural Resource Conservation Service representative assigned to your county. Outdoor burning may require a permit before being conducted. Contact the Department of Forestry for details.

# Cottontail Rabbit

The average-size Tennessee farm (135 acres) has plenty of room for rabbit management. Under good conditions, the home range of a cottontail is often less than 5 acres. Rabbits need well-distributed escape cover (such as brushpiles and honeysuckle or briar thickets), an ample year-round food supply, and safe places for nesting and raising their young.

## Food Management

Rabbits eat plant foods. Grasses are nearly year-round foods, although not heavily used during the summer. Clover, sprouting wheat, corn kernels and milo seeds are important during fall and winter. Good summer foods are white clover, timothy, and Korean or kobe lespedeza. These foods must be of high quality and next to good rabbit cover (see Green Browse Plot, Chapter 10).

## Important Food Plants For Rabbits:

Asters, cinquefoil, clovers, crop residues, dandelion, Fall panic grass, fleabanes, horse nettle, knotweed, Korean and kobe lespedeza, foxtail, plantains, poison ivy, ragweeds, sedges, smartweeds, strawberry, sumacs, tick trefoils, timothy, and native warm season grasses.

### Water Management

Although rabbits drink during hot, dry spells, they obtain most of the water they need from the succulent plants they consume.

### Cover Management

Dense, well-distributed protective cover is the most critical element in good rabbit habitat.

Brushpiles, located in the right places, bring the quickest response of all the management tools. Rabbits often take over a brushpile the night after construction. Place brushpiles close to other permanent cover, such as briars, fencerows or woods (see Brushpile Construction, Chapter 10). Don't burn brushpiles left from clearing, instead, push them to the edges of the field for cover.

Discarded Christmas trees make ideal brush piles for rabbits. To make them even more effective, place an old wooden pallet or some other similar material on the ground and then pile enough Christmas trees on top to make a pile about the size of a car.

Hinge cutting cedars and locusts is a useful technique to providing cover for rabbits. If the tree is not cut all the way through, but allowed to be "hinged" or "lopped over" and remain attached to the stump, the twigs and limbs will remain alive for several year, providing both food and cover.

Odd or non-agricultural areas, such as woodlots, gullies and pond sites, that are allowed to grow briars, brush and tree sprouts will provide excellent nesting sites for rabbits and other wildlife. Fencing these areas to exclude cattle improves existing cover and allows grass and shrubs to thrive. When fencerows are protected from grazing and the larger trees along the row are topped, the resulting low, dense growth will also provide good rabbit cover.

## Wild Turkey

### Food Management

The number-one food of wild turkeys throughout the year is acorns, but they also eat the seeds, buds, leaves and tubers of many other plants. Their principal natural plant foods fit into a few general categories: mast (acorns and pine seeds); fruits (dogwood, grapes, cherry, gum, persimmon, juniper); seeds (native grasses and sedges, weeds); and greens (grasses and grass-like plants, selected annual and perennial broad-leaved plants).

These birds also eat insects, and a management plan for year-round food must include clearings where they can forage for them. Turkey poults feed almost entirely on insects the first two weeks of

life. At least ten percent of the forest area should be in scattered openings for optimum turkey habitat. These openings provide green forage and insects the turkeys need.

Seasonal fluctuations in one type of natural food will usually create few problems for wild turkeys. Low production of one food usually coincides with high production of another and because of turkeys diverse food habits, when one food fails, they will find another.

Domestic crops such as soybeans, cowpeas, buckwheat, sorghum grain, corn, oats and millet also are desirable foods for turkeys.

## Important Food Plants For Turkeys:

Acorns, bedstraw, blackberries, buttercups, cherries, clovers, crop residues (corn, milo, soybeans, etc.), dandelion, dogwoods, goldenrods, grapes, hackberry, hawthorns, insects, Korean and kobe lespedeza, native warm-season grasses, poison ivy, ragweeds, roses, sedges, smartweeds, sorrels, strawberry, sumacs, sunflowers, tick trefoils, and wild beans.

**Grain food plots -** Annual grain food plots for turkeys (and deer) not only supplement natural foods, but also help in extremely bad weather or during drastic natural food shortages (see Grain Plots, Chapter 10).

**Green browse plots -** Permanent one-acre food plots can be established in forest clearings. Apply recommended amounts of limestone and fertilizer to a good, clean-tilled seed bed, then seed to wheat and clovers (see Green Browse Plot, Chapter 10).

**Crop residues -** Corn fields attract turkeys during severe weather in late winter and early spring, when other food is in short supply. A few rows of corn left standing next to timber will provide a food supply in winter.

**Idle fields -** Abandoned fields surrounded by timber can provide an important part of the annual range of wild turkeys. Try to keep old fields open and in a grass-legume mixture. Mowing or moderate grazing helps, because turkeys tend to avoid fields grown up in dense vegetation. Controlled burning on a 1-3 year rotation will also provide good cover for turkeys.

## Water Management

Wild turkeys require surface water and ordinarily are not found where it is lacking. One pond, stream or other water source per quarter-section of land is usually adequate for good turkey habitat. Ponds need only be large enough to hold some standing water through the summer.

### Cover Management

Turkeys prefer open, mature woods, but they also use timber stands that have grown beyond the small-pole (2"-9" diameter at breast height, or DBH) stage, if the understory is not too dense. Studies show that saw-timber stands (greater than 9" DBH) will support twice as many turkeys as any other woodland type.

## White-Tailed Deer

### Food Management

White-tailed deer are “browsing” animals. They eat the succulent tips of many different shrubs, vines and trees, along with a variety of other foods. No one food predominates throughout the year; what deer eat depends on the availability of the food, its abundance, and the season. A deer management plan should include adequate food supplies for all times of year.

**Spring and summer browse -** Summer foods consist mainly of the leaves of annual and perennial plants and shrubs. Deer prefer summer grape, red clover, Virginia creeper, and Korean lespedeza during this period.

**Fall and winter foods -** If plentiful, acorns are the primary food. Lacking acorns, deer feed on corn, lespedeza, wheat, other crops, and native plants such as sumac and buckbrush. Twigs of sapling trees and various shrubs are also important winter foods.

### Important Food Plants For Deer:

Acorns, crop residues, asters, blackberries, black haw, cherries, cinquefoil, clovers, coralberry (buck brush), dogwoods, elms, fleabanes, goldenrods, grapes, greenbriers, hazelnut, honeysuckle, Korean and kobe lespedeza, lettuces, maples, persimmon, poison ivy, pokeweed, roses, sumacs, spurge, strawberry bush, tick trefoils, violets, Virginia creeper

Woodlots can be managed for deer food production by maintaining acorn-producing trees, creating brush, and protecting the woodlot from grazing cattle. About 54 percent of the deer’s year-round diet is acorns. For a good supply of acorns, maintain mature oak trees of several species, such as post, black, white, northern red, chinquapin, blackjack and scarlet. About 20 acorn-producing oaks per acre are required to support deer. These trees should average at least 14 inches in diameter at breast height (DBH). The number of acorns produced by each tree will depend on its crown size, age, and health, and on the weather. The woodlot should be fenced to exclude

livestock, since they compete directly with deer for food.

Creating “brush’’ or “browse” is the most commonly used technique for improving white-tailed deer habitat. The brush stage, or seedling/sapling forest, has nearly three times the amount of twig production (browse) per acre than a saw-timber stand. Timber harvest is a good way to create brush, but be sure to leave enough mature oak trees for a satisfactory acorn crop.

Shrubs and vines are another type of brush. Some common shrubs and vines browsed by deer are: blueberry, flowering dogwood, witch-hazel, serviceberry, huckleberry, strawberry bush, honeysuckle, greenbriers, and viburnum.

### Water Management

Deer require water from a surface source daily. Their water needs are partially met by the succulent plants they eat, but the lack of water may keep deer from using areas that otherwise have good habitat. A management plan for deer should include at least one water source per square mile.

### Cover Management

Evergreens stands are important deer habitat. They provide shelter from the weather, escape cover and food during winter. Cedar and pine groves as small as 5 acres are excellent shelter once the trees are 10-15 feet high.

## Squirrel

Almost half of Tennessee is forested, and hardwoods are an abundant component. Squirrels occur statewide and are abundant in most areas. They have small home ranges of one to five acres and are commonly found even in small woodlots and wooded fencerows. You can increase the number of squirrels on most farms that have some woods. Certain practices, such as installing den boxes, give prompt results; others require several years to take effect.

### Food Management

Woodlands of around 40 acres or larger, with at least 50-75 trees that produce nuts, seeds or fruits (such as oak, hickory, walnut, elm, maple and mulberry) are usually good squirrel habitat. Mature trees will increase the volume of food produced.

Timber stand improvement (TSI), which reduces competition among trees, will increase the production of acorns and other squirrel foods. Any practice that increases the diversity of plants within a woodlot will usually benefit squirrels.

### Important Food Plants for Squirrels:

American elm, American plum, apple, bitternut hickory, black oak, black walnut, chestnut oak, chinquapin oak, corn, fungi, honey locust, mockernut hickory, Osage orange, pecan, pin oak, post oak, red mulberry, red oak, shagbark hickory, shellbark hickory, shumard oak, silver maple, wheat, white oak, wild grape

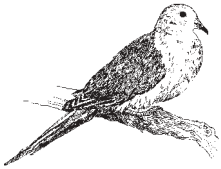
In years when natural foods (especially acorns and nuts) are in short supply, squirrel feeding stations stocked with corn, nuts, and other foods can be beneficial.

### Management for Den Sites

The supply of den trees, those with cavities for shelter and nesting, is a major factor limiting squirrel populations. A mature forest usually has more cavities for squirrels than a younger woodland. Refer to Chapter 5 for details on managing a woodland for den trees.

Although squirrels will build leaf nests in trees, cavities in hollow limbs or trunks are preferred and much more secure. In woodlots with fewer than four natural dens per acre, artificial dens will be of value. A pair of squirrels usually requires two to three dens - one each for the male and female, and one for raising the young. Competition for dens among squirrels, owls, bees, snakes and other cavity users is intense. When artificial dens are supplied, some of this competition is reduced. Dens can be built from auto tires, rough lumber, sawmill slabs, nail kegs, or hollow logs cut in sections. See Chapter 10 for squirrel den box plans and details.

## Mourning Dove



Mourning doves are migratory birds and move over large areas feeding primarily on seeds form agricultural crops and weeds. They usually remain in a general location for months, as long as there is abundant food. In late summer, adult doves join large flocks of juvenile birds and concentrate, often in large numbers, on harvested fields and recently mowed or burned areas. These habits make mourning doves easily managed for hunting.

There are many ways to prepare a field for dove hunting and many crops that can be planted. It takes a great deal more effort these days to have good dove hunting when you want it without resorting to top-sowing wheat and risking a potentially baited field. Crops which are grown in a field, may be manipulated in that field, by mowing, burning, harvesting, or other method, without the great risk of illegal baiting. (Check with the TWRA for current regulations) The right crops have to be planted at the right time, as well as

mowed, burned, or manipulated, in some fashion for optimum effectiveness in attracting doves.

In planting a dove field, consider how many hunters will be utilizing the field. A general rule in most cases is to have an acre of land per hunter, but this may vary, depending on the lay of the land. Hunting in an overcrowded dove field can be dangerous and unrewarding, so consider the number of hunters you want to accommodate and plan accordingly.

Doves do not have very strong legs and prefer relatively clean ground for feeding. This can be accomplished in several ways. The use of herbicides, cultivation, mowing, and burning are all methods used to meet this end. Some crops create enough shade to reduce weed competition. Thick stubble will discourage doves from using a field.

It is recommended to have a soil sample taken and analyzed by the Agricultural Extension Service. Always follow the soil test recommendations for applications of fertilizer and lime. The best dove fields have a common thread...abundant food that is readily available to doves. Good farming practices will be rewarded with consistent, annual, dove shoots.

When planting a dove field, consider this: A diversity of foods is usually best, and some crops are preferred at different times during the season. High carbohydrate foods such as corn, attracts doves better when the weather turns cool in the late fall. Crops that produce small seeds are often preferred in early September. Included below is a list of commonly grown foods for doves.

***Corn -*** Excellent for early or late season. There are several ways to prepare a cornfield to attract doves. Mowing is the most common method used.

Cornfields cut for silage often attract large numbers of doves and can provide good shooting. However, to increase the amount of available food left in the field to attract doves, leave an acre or more of corn standing in the field. After cutting silage, the standing corn can then be mowed or cut. Landowners can often find hunters willing to pay for the privilege of hunting, and a good cornfield, averaging 100 bushels per acre, bringing $250-300 per acre, can often be recouped through hunting fees.

A particularly effective method of preparing a cornfield for dove hunting involves the use of a silage chopper to cut standing corn. Using this method, corn should be left in rows, (preferably 4 rows) scattered across the field. Disc the ground on either side of the standing rows, and use the silage chopper to cut down and blow the corn onto the freshly disced strips. This offers maximum availability for doves without costing much money.

***Sunflower -*** Probably the best and certainly the most popular dove food. Keep the ground clean with cultivation and herbicides. Leave some standing rows to provide natural hunting blinds.

***Sesame -*** Also known as Benne and sometimes swamp pea. It

grows about 4-8 feet tall, shades out most weeds, and is usually planted in rows and left standing for the entire season. It is an excellent dove food. However, sesame requires a long growing season and requires 120-150 days to mature.

***Millets*** **-** There are several varieties of millet. White proso grows rapidly, producing seed in about 45 days. It is one of the best dove foods known due to its hard seed coat which is resistant to mold. The seeds scatter readily when mowed or burned. White proso is an excellent choice for September dove shoots.

Dove proso is similar to white proso but grows 3 to 6 feet tall. The seeds do not mature at one time, but drop throughout the fall.

Browntop millet is a heavy seed producer, maturing in about 45 days. It is an old favorite for dove hunts.

Pearl millet grows 3 to 8 feet tall. It tolerates drought and soil acidity (5.5-6.5) and is also a heavy seed producer.

***Wheat*** **-** Wheat makes a great dove field when left standing throughout the summer and burned prior to hunting in the fall.

***Sorghum*** **-** Grain producing varieties of sorghum like milo and WGF have similar nutritional value to corn. It has a small seed which is favored by doves. It is drought tolerant, but does poorly on highly acidic soils.

There are other crops which are attractive to doves, but the above list includes the most commonly grown. Any of these can provide great dove hunting, but some may have advantages on different fields or times of year. Don't be afraid to experiment and try different crops and methods.

## Waterfowl

Waterfowl require several types of habitats and foods to meet their needs during winter. Waterfowl tend to remain longer in areas with habitat complexes than in areas with single habitat types.

Small-grain fields can provide important habitat for wintering waterfowl. Although croplands are the habitat type most frequently developed by private landowners, small grains do not provide a nutritionally complete diet for waterfowl. Naturally occurring seeds from plants associated with wetlands regularly survive flooding for several months or even years, whereas grains such as corn, Japanese millet, milo, and soybeans deteriorate rapidly when flooded continuously for 90 days or more. Grassy-weedy areas are important because native plants, such as grasses, sedges, and smartweeds, supply essential nutrients. Forested wetlands fulfill special waterfowl habitat requirements not provided by open lands. Wooded habitats produce nutritious foods for waterfowl and provide them with secure roosting areas.

The natural flooding of wetlands provides ducks access to fallen acorns and other seeds. Waterfowl use areas longer if the entire area

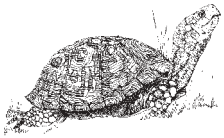
is flooded over a long period of time versus short-term flooding.

When creating waterfowl areas through the use of terraces, crops, and artificial flooding, it is best to avoid placing levees or terraces in the annual floodplain, since they are high-risk management areas. Levees and terraces in the annual floodplain are impediments to natural water flows can be harmful to natural wetlands. Any water control structures should be developed above the one year floodplain to hold 1-18 inches (preferably 4-8) of water. Low level terraces on well drained, gently sloping or nearly flat farmland can be highly productive for waterfowl foods and hunting success.

### Important Waterfowl Foods:

Barnyard grass, sedges, smartweed, foxtail, Japanese millet, browntop millet, grain sorghum, corn, Fall panicum, hairy crabgrass, beggarticks, spike rush, pondweed, acorns, pearl millet, wild millet, nutsedge, and aquatic insects

## Non-Game Species



Non-game animals, such as songbirds, frogs, toads, salamanders, and turtles are essential to the biodiversity of our state. Tennessee is home to almost 1400 wildlife species. Almost 90 percent of those species are not hunted and provide enjoyment to Tennessee landowners through viewing and photography. Non-game wildlife is an integral component of the community of game species and are indicators of habitat quality.

Tennessee has a diverse array of non-hunted wildlife species, having a wide range of specific habitat requirements, which are beyond the scope of this publication. However, information is available for the management of such species as neotropical migratory birds, forest interior and grassland species, reptiles, shorebirds, and even cave management for cave dwelling wildlife.

For information on specific non-game species habitat management, contact the Wildlife Division of the TWRA, Ellington Agricultural Center, P.O. Box 40747, Nashville, Tennessee 37204.

CHAPTER 9

# *Wildlife Management Services*

Technical help with wildlife and fisheries habitat improvement as well as woodland resource management on your farm is available free of charge from several agencies. In addition, some financial help may be available if certain requirements are met.

These agencies, their field representatives, and the services they provide are described below.

## Tennessee Wildlife Resources Agency

The Tennessee Wildlife Resources Agency is responsible for managing the fishery and wildlife resources of the state. All of the field personnel serve multi-county areas, with the exception of the wildlife officers. Field personnel may be contacted locally or by writing to the Tennessee Wildlife Resources Agency, Ellington Agricultural Center, P.O. Box 40747, Nashville 37204.

### Wildlife Officers

A wildlife officer is assigned to each county. Should you not know your local wildlife officer, contact the sheriff's office, University of Tennessee Extension Center, or write to the above address.

Wildlife officers enforce hunting, fishing, and boating laws, rules and regulations. Wildlife officers also assist private landowners with wildlife, fisheries and forest management. For example, they give on-the-farm habitat recommendations, provide application forms for fish stocking of private lakes or ponds, and distribute seeds for wildlife plantings. Officers are the contact persons for assistance with wildlife damage. If a request for assistance is outside the officer's expertise, he or she will refer the interested person to the appropriate Agency specialist.

Educating the public about Tennessee's wildlife and fisheries resources and their regulation is a major part of the wildlife officer's job. Officers frequently give presentations to groups and appear on radio and television programs. They focus much of their effort on hunter education classes.

### Wildlife Management Biologists

These biologists are wildlife management specialists. At a landowner's request, they will make recommendations for improving wildlife habitat to meet the owner's conservation goals. They are particularly knowledgeable about the ways that farming systems, wildlife management, and government agricultural programs can blend together productively.

Wildlife management biologists hold workshops for landowners and give presentation to farmers' organizations, civic clubs, and hunting and wildlife-oriented groups. They work closely with agricultural agencies such as NRCS, University of Tennessee Agricultural Extension Service, and FSA. They also provide technical support to agricultural education instructors on wildlife projects. Tennessee Wildlife Resources Agency currently has two Forest Stewardship Biologists responsible for technical assistance with wildlife management recommendations for landowners' multiple objectives. These biologists coordinate with the Forestry Division of the Tennessee Department of Agriculture in developing Forest Stewardship Plans to improve forests for timber production as well as wildlife habitat.

### Fisheries Management Biologists

These biologists provide technical help in management of private impoundments and streams. They give advice and assistance to landowners with regard to pond stocking, aquatic weed control, water quality improvement, fish population management, streambank stabilization and revegetation, and other aspects of fisheries management.

## Tennessee Dept. of Agriculture/Forestry Division

Area Foresters are established in 33 locations throughout the state. These foresters, who have multi-county assignments, offer a broad array of professional and technical services to help you manage your valuable forestlands. They also oversee wildfire control and prevention efforts, and administer the issuance of permits required for outdoor burning.

The Forestry Division controls and manages 16 State Forests for multi-purpose uses across the state. The division also provides forest tree seedlings for sale through the State Nursery.

Services offered to private woodland owners include comprehensive forest management planning, woodland wildlife management, timber sales and harvesting advice, information on assessing woodland investments, a cost-share program for planting trees on marginal and highly erodible lands, tree planting advice, and

information on controlling forest insect pests and diseases.

Area offices are normally listed in the white pages under "Tennessee State Government, Department of Agriculture-Forestry Division." Foresters may also be contacted by writing, Tennessee Department of Agriculture-Forestry Division, P.O. Box 40627 Melrose Station, Nashville, Tennessee 37204, or by calling (615) 837-5411. Further information is available by looking for the Department of Agriculture at the State of Tennessee website.

# Tennessee Dept. of Environment and Conservation

TDEC

Tennessee is rich in its great diversity of natural and cultural resources. Protecting the quality of Tennessee's air, land and water and preserving, conserving, enhancing and promoting our natural and cultural resources is the mission of the Department of Environment and Conservation (TDEC). While any of the Department's many Divisions may be of assistance to the private landowner, two Divisions in particular are most likely to be of assistance regarding the management land. Both the Division of Natural Heritage and the Division of Water Pollution Control frequently work with individual landowners on issues relative the management of natural resources. For more information on TDEC and any of its Divisions, please visit our Home Page on the World Wide Web at http://www.state.tn.us/environment, or contact the Department by phone at 1-800-891-TDEC (8332)

## Division of Natural Heritage

The mission of the Tennessee Division of Natural Heritage is to restore and protect the native species of plants and animals, and the natural communities, that represent the biological diversity of Tennessee. The Division administers the Tennessee Natural Areas Preservation Act of 1971, the Tennessee Scenic Rivers Act of 1968, the Rare Plant Protection and Conservation Act of 1985, the Ginseng Dealer Registration Act of 1983, and the Ginseng Harvest Season Act of 1985. The Division carries out its mission through the following individual programs: Natural Heritage Inventory, Natural Areas, Rare Plant Protection, Ginseng and Nursery Licensing, Environmental Review, Rivers and Wetlands, and Administrative and Policy Support.

The Division of Natural Heritage, with a staff including professional biologists, botanists, zoologists, ecologists, natural resource management specialists, and data managers, conducts a wide variety of programs and activities focused on the conservation, restoration and management of Tennessee's vast diversity of natural resources. These activities include cooperative projects with and technical assistance for governmental agencies, non-governmental organiza-

tions, industrial landowners, private landowners, and educational institutions. In conducting these activities highly technical tools are employed such as remote sensing products, global positioning satellite devices (GPS), geographic information systems (GIS), and lap top field computers.

The Division places a strong emphasis on working with private and public landowners to protect and restore populations of rare species of both terrestrial and aquatic plants and animals, as well as rare and high quality natural communities.

If you are interested in information regarding terrestrial or aquatic species of rare plants and animals, and their habitats, or in opportunities to restore and protect populations of rare plants and animals and their habitats on your land, this Division may be of assistance to you.

For more information about the Division of Natural Heritage, please visit our Web Site at http://www.state.tn.us/environment/nh, or contact us by mail or phone as follows:

Tennessee Department of Environment and Conservation
Division of Natural Heritage
14th Floor, L&C Tower
401 Church Street
Nashville, TN 37243-0447
615-532-0431

## Division of Water Pollution Control

The Division of Water Pollution Control provides technical assistance and regulates activities such as stream channel modifications, wetland alterations or gravel dredging. No permit is required to remove downed trees from stream channels by winching or dragging, but most other work on stream banks or channels with heavy equipment requires authorization by the Division. An average of 850 Aquatic Resource Alteration permits, including 125 gravel dredging authorizations, are issued annually.

Through some 120 sampling stations the Division monitors, analyzes, and reports on the quality of Tennessee's water. In addition, a number of specific surveys are conducted, including studies of in-stream biological communities and documentation of contaminant levels in sediment and fish flesh. The fish and bacteriological data generated by the Division are used by the Department to issue advisories to the public when levels of contaminants exceed those thought to be protective of public health. Numerous complaints and inquiries are investigated and responded to each year.

If you are conducting activities that may alter or impact aquatic resources such as rivers, streams or wetlands, you should first contact this Division.

For more information about the Division of Water pollution

Control, please visit our Web Site at http://www.state.tn.us/environment/wp, or contact us by mail or phone as follows:

Tennessee Department of Environment and Conservation
Division of Water Pollution Control
6th Floor, L&C Annex
401 Church Street
Nashville, TN 37243-0447
615-532-0625

## Agricultural Extension Service

The University of Tennessee Agricultural Extension Service provides technical assistance on a broad range of agricultural projects. The offices and Extension agents have a wide selection of printed material available on various aspects of Agriculture, forestry, horticulture, home economics, wildlife conservation and wildlife damage to property and crops. Your University Extension office will also do soil testing and help you interpret the results.

University Extension has Extension Agents stationed in every county of the state. They will work individually with farmers or give presentations to groups on agricultural topics.

Your county extension office is listed in the yellow pages under "_____ County of''. It is often listed as ''University of Tennessee Agricultural Extension Service.''

## Farm Services Agency

The Farm Services Agency (FSA) is a unit of the U.S. Department of Agriculture (USDA). FSA works closely with the Natural Resources Conservation Service (NRCS) in the administration of USDA programs that provide loans, price support, cost-sharing and other ways to assist landowners financially with approved conservation practices. On the local level, the FSA is assisted by a committee of landowners to insure programs meet both federal policy and local needs.

This agency may offer several types of programs that can assist landowners in providing food, cover, tree plantings and water for wildlife through cost-sharing and incentive programs. (Note: Cost-share or incentive programs vary from year to year, depending upon available Federal revenues. Landowners should check with the various agencies concerning available programs and their individual sign-up dates.)

Your local FSA office is normally listed in the white pages of your telephone directory under "United States Government - Agriculture, Department of - Farm Services Agency." Usually, this office is

located in the same building with the local office of the Natural Resources Conservation Service.

## Natural Resources Conservation Service


The Natural Resources Conservation Service is a unit of the U.S. Department of Agriculture (USDA). NRCS is responsible for the technical aspects of USDA programs, and works closely with the Farm Services Agency in the administration of these programs.

Local NRCS personnel can assist in developing conservation plans that detail the practices necessary to protect your land from erosion, improve water quail and create better fish and wildlife habitat. They will also make forage and crop management recommendations, help with the design of terraces, waterways, and ponds, and suggest plant species which best meet your resource needs.

Your local NRCS office is listed in the telephone book white pages under “United States Government - Agriculture, Department of - Natural Resources Conservation Service.”

## Non-Governmental Organizations

Non-government, non-profit organizations also exist which can often provide additional information or technical assistance. Some may also have planting materials or financial incentives. You may wish to contact your Tennessee Wildlife Resources Agency office to find contacts for local chapters of the following organizations:

DUCKS UNLIMITED
NATIONAL WILD TURKEY FEDERATION
QUAIL UNLIMITED
WHITETAILS UNLIMITED

# CHAPTER 10

# *Wildlife Management Practices*

This chapter describes many habitat management practices that have proved to be effective. If you are interested in more practices of this type, help is available from professionals in this field. Refer to Chapter 9 for a list of the agencies specializing in this type of resource management.

**Index to Chapter 10**



## Green Browse Plots

A green browse plot of legumes (clovers, lespedezas, peas) with a thin stand of grass will provide green forage for turkeys, deer and rabbits. It will also attract an abundance of insects for turkey poults and quail chicks.

### Size and Location

Green browse plot size should be matched to the species targeted. A plot for quail or rabbits may be as small as 1/4 acre, but a plot for

deer or turkeys may need to be at least an acre. (see Field Measurements, Wildlife Plots).

Locate plots on level ridge tops, in bottomlands, or along the contour of gentle slopes. The site should be open, tillable and next to suitable cover. Placing the plot at least 50 feet from any woodland edge will reduce competition from trees and allow sunlight to reach the planting. A buffer strip of perennial weeds and woody shrubs will develop over time between the browse plot and the timber, if tall fescue is not present. If fescue is present, it should be eliminated.

Green browse plots should be spaced about one-fourth mile apart or one per 40-acre area for deer and turkey. To be effective for rabbits, however, these plots should be about a quarter or half-acre in size and about a 100 yards apart.

## Seed Bed Preparation, Liming and Fertilizing

Prepare the seedbed in September or early October. The ground should be plowed and disced until no live vegetation exists. Before seeding, the plot should resemble a vegetable garden ready to be planted. Remember, there is no substitute for a good, well-prepared seed bed.

Correct fertilization is essential for the successful establishment and long-term maintenance of the green browse plot. Before planting, obtain a soil sample from each plot site (see How to Take a Soil Sample in this chapter). Take this sample to the University Extension Center for analysis. The results of this test will show what fertilizer should be added. The Extension Agronomist can then provide recommendations for both initial fertilization and annual topdressings of fertilizer. (See Interpretation of Soil Test Results in this chapter.)

Disk fertilizer and limestone into the soil at the time of seed bed preparation. If recommendations on fertilizer amounts cannot be obtained in time for planting, the following starter application should be sufficient. Correct any deficiencies by top-dressing with additional fertilizer at a later date.

**Starter Fertilizer -** Apply 500 pounds of 6-12-12 fertilizer per acre at the time of seed bed preparation. This amount may be sufficient for three to four years, after which time a fertilizer top dressing may be required. This initial application will supply 30 pounds of nitrogen (N), 60 pounds of phosphorus (P205), and 60 pounds of potassium (K20) per acre.

**Lime -** If the site has never been limed, apply agricultural limestone at the rate of 3-4 tons per acre. A soil test will indicate whether the soil pH needs to be regulated by adding more limestone.

### Seeding

Each one-acre green browse plot should be uniformly seeded with bushel (30 pounds) of winter wheat and 2 pounds of orchard grass at the time of seedbed preparation (late August or early September). At the same time or in early winter, half of the plot should be over-seeded with 2 pounds of ladino clover and 2 pounds of red clover. The following spring (January-March), the other half is overseeded with 10 pounds of lespedeza, which can be Korean, kobe, summit, or a mixture of these. The lespedeza will provide seed for quail and green forage for other wildlife during the summer when clovers may become dormant.

### Maintenance and Protection

Mow the plots each year between July 1 and July 15 to reduce any unwanted weeds, using either a rotary or sickle mower. Renovate and reseed the plot in three to four years, if the grasses or weeds have crowded out the legumes.

For maximum value to wildlife, plantings must be protected from excessive grazing. Light grazing to remove about one-half of the growth during the last half of June is desirable in lieu of mowing, however, do not graze during the fall or winter months.

## Annual Grain Food Plots

Many wildlife species depend on and prefer native weed seeds and wild fruits for winter food. When ice and snow cover these natural food sources, wildlife will then benefit from standing grain. High-quality food can be provided by planting small grains in properly located food plots.

Grain plots with soybeans or other legumes will attract insects and provide seed and succulent green browse, that quail chicks, deer, turkey and many songbirds will use.

### Size of the Grain Food Plot

A grain food plot should be at least one-half acre in size. Smaller plots will not supply enough food for the long winter months (see Field Measurements for Wildlife Plots in this chapter). Each year, plant half of this area (one-fourth acre) with grain and allow the other half to grow weeds for seed and cover. The following year, plant the “weedy” part and allow the first half to grow weeds. This rotation will provide native seeds for food, some bare ground for dusting, and standing grain for emergency food. It will also make better use of the fertilizer that you have applied and reduce the cost

of planting.

The shape is not important. An irregularly shaped plot with "islands" of good cover within the planted area is even better than a rectangular plot.

## Location and Protection

Grain food plots must be located near brushy draws; corners of shrubby fence rows and along edges of wooded areas. Old fields or idle areas are excellent sites. Brush piles can be added for escape cover and weeds should be allowed to grow. At least six brush piles about 15 feet in diameter should be located around each grain food plot (see Brush Pile Construction in this chapter).

**Caution -** Livestock must be excluded if the grain plot is to be of any value to wildlife. Also, after frost or drought, grain sorghum can be poisonous to livestock. For these reasons, grain food plots should be located in ungrazed areas, or fenced.

## Number of Plots to Plant

As a rule, one grain plot for every 40 acres of farmland is a minimum. On farms where grain crops are grown, fewer plots are necessary if crop residue and some grain is left standing next to cover. More plots would be required on a pasture farm where no grain is produced, however.

## Seed Bed Preparation and Planting Time

Grains must be planted in a clean-tilled seed bed. The ground should be plowed and disced in early spring until no live vegetation remains, resembling a vegetable garden before planting. The fertilizer and limestone should also be worked into the soil at this time. Planting time for most of Tennessee will be between April 15 and June 15, depending on the amount of spring rainfall and other local factors.

## Fertilizer and Lime

The one-fourth acre plot should be treated with at least 150 pounds of 12-12-12 (or 13-13-13) fertilizer at the time of seed bed preparation (fertilize larger plots accordingly). This amount will nearly equal the nitrogen used by the grain crop, and will more than replace the phosphorous and potassium. This is a general recommendation when the results of a soil test are not available. If time permits, use soil test results to determine fertilizer and lime requirements (see How To Take a Soil Sample and Interpretation of Soil Test Results, in this chapter).

Limestone is added to regulate the active soil acidity, or pH, which affects the availability of many other soil nutrients. Grain sorghum grows best in a soil pH of 6 to 6.5. If the soil test shows a pH of around 5, for example, a one-fourth acre plot will require approximately three-fourths to one ton of crushed limestone. Should the pH be near 6, only 400 to 500 pounds of limestone will be needed.

## Kinds of Grain to Plant

Sorghum (milo) seeds are rich in energy, persistent on the plant, and usually available to wildlife when other seeds are covered by snow or ice. If only one grain is to be planted, grain sorghum will give the best results. Plant grain sorghum at the rate of 4 pounds per one-fourth acre plot (or 8 pounds per half-acre and 16 pounds per acre).

Additional Grain Mixtures (in order of preference) are:

| | **lbs./fourth acre** | **lbs./acre** |
|---|---|---|
| **NO. 1** | | |
| Grain sorghum | 2 | 8 |
| Soybeans | 3 | 12 |
| **NO. 2** | | |
| Grain sorghum | 2 | 8 |
| Soybeans | 2 | 8 |
| German millet | 0.5 | 2 |
| **NO. 3** | | |
| Grain sorghum | 3 | 12 |
| Sunflowers | 2 | 8 |

*Caution - planting too much seed will result in competition between the plants and will reduce the amount of grain produced. The above seeding rates will allow the production of both grain and beneficial weeds that will also supply food and cover.*

# Field Measurements for Wildlife Plots

| Number Feet | Number Steps (2.5 feet/step) | Number Yards |
|---|---|---|
| 105 x 105 | 42 x 42 | 35 x 35 |
| 75 x 150 | 30 x 60 | 25 x 50 |
| 65 x 170 | 26 x 68 | 22 x 57 |
| 50 x 220 | 20 x 88 | 17 x 73 |
| 40 x 275 | 16 x 110 | 13 x 92 |
| 30 x 365 | 12 x 146 | 10 x 122 |
| 20 x 550 | 8 x 220 | 7 x 183 |

These measurements will define an area of approximately one-fourth acre. For larger plots, multiply one of the numbers of a pair by: 2 = ½ acre; 3 = 3/4 acre; and 4 = an approximate acre. For a field corner plot, measure along each fence (or axis) 150 feet from the corner post and then connect the two points.

**Acre/Square Feet Conversions:**

| | | | |
|---|---|---|---|
| 1 acre | 208.7 x 208.7 feet | = | 43,560 square feet |
| 1/2 acre | 104.4 x 208.7 feet | = | 21,788 square feet |
| 1/4 acre | 104.4 x 104.4 feet | = | 1 0,899 square feet |

# Grass-Legume Mixtures Beneficial to Wildlife

| | Seeding Rate |
|---|---|
| **No. 1** | |
| Wheat (fall) | 30 |
| Orchard grass | 2 |
| Ladino clover | 2 |
| Red clover | 2 |
| Korean or kobe lespedeza | 10 |
| **No. 2** | |
| Wheat (fall) | 30 |
| Timothy | 1 ½ |
| Orchard grass | 10 |
| Alfalfa | 12 |
| Ladino clover | ½ |
| **No. 3** | |
| Timothy | 8 |
| Medium red clover or alfalfa | 8 |
| **No. 4** | |
| Orchard Grass | 8 |
| Korean lespedeza or med. red clover | 10 |
| Ladino clover or Alfalfa | ½ 8 |

***Rate = Bulk Pounds Per Acre, Broadcast***

# Plantings Beneficial to Wildlife

| Kind of Seed | Pounds Per Acre | Time to Sow |
|---|---|---|
| Alfalfa | 15-20 | Aug. 15 - Sep. 15/Mar. 1 - May |
| Barley | 60-120 | Sep. 15 - Nov. 1 |
| Bluegrass-Pasture | 10-20 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Bluegrass-Lawn | 30-40 | Anytime |
| Bromegrass | 15-20 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Buckwheat | 35-50 | May 15 - Aug. 1 |
| Clover, Alsike | 4-8 | Aug. 15 - Oct. 1 |
| Clover, Crimson | 10-20 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Clover, Red | 5-10 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Clover, Ladino | 2-4 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Clover, White Dutch | 3-6 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Corn (rows) | 10-15 | Apr. 1 - Jun. 1 |
| Lespedeza (Korean, kobe) | 15-30 | Feb. 15 - Apr. 1 |
| Millet, Browntop | 15-20 | May 15 - Aug. 1 |
| Millet, German | 15-20 | May 1 - Jun. 1 |
| Millet, Pearl | 20-30 | May 1 - Jun. 1 |
| Oats | 60-120 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Orchardgrass | 10-20 | Aug. 15 - Oct. 1/Feb. 20 - Apr. 1 |
| Redtop | 8-10 | Aug. 15 - Oct. 30 |
| Rye, Winter | 60-90 | Apr./early Sep. |
| Sorghums, Forage | 8-10 | May to Jun. 20 |
| Sorghum, Grain (milo) | 10-15 | Jun. 15 to Jul. 1 |
| Soybeans (rows) | 30-60 | Apr. 1 - Jun. 10 |
| Soybeans (broadcast) | 60-120 | Apr. 1 - Jun. 10 |
| Sunflower | 12 | Late Apr. to Late Jun. |
| Timothy | 8-10 | Aug. 15-Oct. 20 |
| Wheat, Winter | 60-90 | Sep. to Nov. |

***Tree and shrubs***

| Shrub Species | Rate | Dates to plant seedlings |
|---|---|---|
| Bicolor VA - 70 | 3' X 3' | Feb. 1 - May 1 |
| Indigo bush | 8' X 8' | Feb. 1 - May 1 |
| **Tree Species** | | |
| Sargeant Crab Apple | 8' X 8' | Feb. 1 - May 1 |
| Oak species | 900/Acre | Feb. 1 - May 1 |

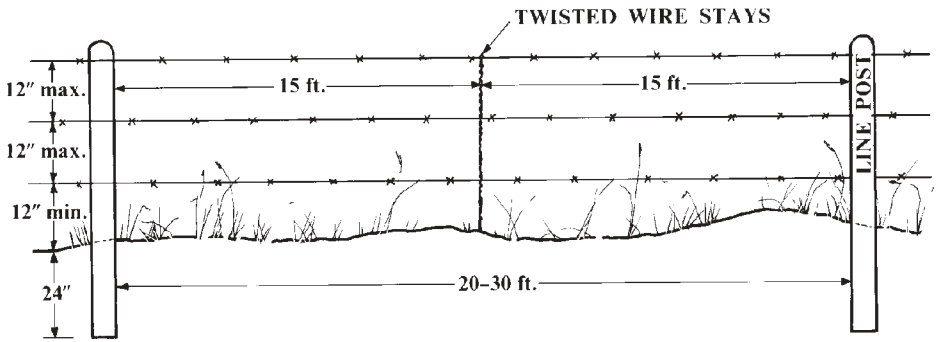
*NOTE: The following plants could have a negative impact on wildlife habitat due to their aggressiveness and growth characteristics. Contact an agency specialist for details: birdsfoot trefoil, Caucasian bluestem, crownvetch, fescue, reed canarygrass, sericea lespedeza, sweet clover, or multiflora rose.*

# Fencing to Protect Wildlife Food and Cover

Fencing is costly but important when managing farmland for wildlife. Fences help protect wildlife food and cover from grazing livestock.

Woven wire or four strands of barbed wire will contain or exclude most livestock. Line posts (steel or treated wood) should be set 15-20 feet apart. If the livestock is not too aggressive, a "suspension'' or three-wire division fence may be adequate and will be less expensive. In this situation, the line posts can be set 30-50 feet apart, with wire "stays" at 10-foot intervals.

Barbed wire is purchased in 1/4 mile rolls (1,320 feet or 80 rods). The following chart will help you determine how much wire you will need to fence four sides of an area.




**Rolls of Wire Required to Fence All Four Sides**

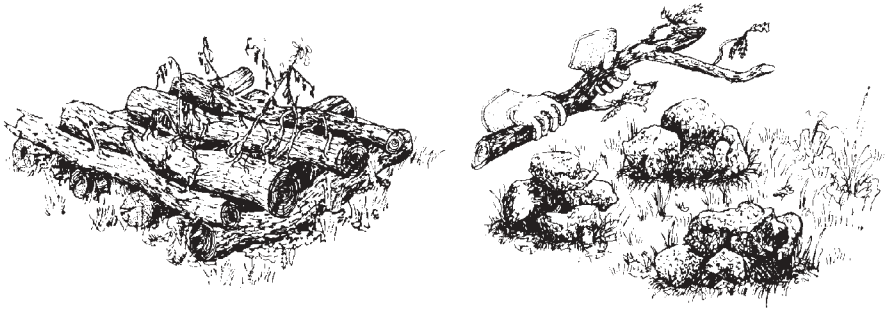
| Plot Size (acres | one wire | three wires |
|---|---|---|
| l/4 | 0.4 | 1.2 |
| ½ | 0.5 | 1.5 |
| 1 | 0.6 | 1.9 |
| 5 | 1.5 | 4.5 |
| 20 | 3.0 | 9.0 |
| 40 | 4.0 | 12.0 |

# Brushpile Construction for Escape Cover

Nearly all animals need cover, so they can escape from predators, rest in safety, nest and raise their young. What constitutes suitable cover depends on the wildlife species. Some animals use hollow trees, while others use brushy areas and dense stands of grass. To several species of small mammals, ground-nesting birds, amphibians and reptiles, brushpiles represent an important type of cover. Brushpiles located in the right places bring the quickest response of all the management tools. Rabbits often take over a brushpile the night after construction.

Proper placement of brushpiles allows relatively safe access to food sources and permits wildlife to forage over a larger area. Brushpiles should be placed at intervals near feeding areas, along field borders and within idle fields or abandoned areas. Avoid the bottoms of drainages and low spots where standing water might render the brushpile useless.

A brushpile should be constructed on a base of larger materials that will provide tunnels and openings beneath the brush at ground level. Three types of bases work particularly well: 1 ) large pole-size logs, 2) piles of rocks, and 3) stumps.



*Both rock piles and poles make good bases for brush piles.*

*Brush can be stacked against stumps to provide tunnels at ground level.*

*Low limbs can be broken and bent to the ground*

*These small trees are only partially cut through and will continue to live for some time.*

First, lay four poles measuring 6 feet by 6 inches on the ground, parallel to one another and about a foot apart. Then lay four more perpendicularly across the first four. If rocks are used, they should be at least 12 inches in diameter, and piled in stacks about 2 feet high. Make three stacks, one at each corner of a triangle. An optional but effective part of a good brushpile would be a sheet of discarded roofing tin or an old car hood placed across this base material.

When either of these bases is in place, stack limbs and brush, using the large limbs first, until the pile is 6-8 feet tall and at least 15 feet wide. If poles or rock are not available, pile the limbs and brush against or over a relatively high stump.

"Living'' brushpiles may be constructed for long-lasting shelter. These are created by cutting part way through small trees and shrubs so that the tops fall to the ground, but enough stem remains uncut on each tree to keep it alive. If the trees are cut to fall in a crisscross pattern over each other, a living brushpile is created. Brushpiles of this type are loosely formed and do not give the best protection from severe weather. They can be made denser by using the bases of the cut trees as foundations and piling dead limbs and brush over them. Care should be taken to leave the live tops of the cut trees uncovered so they will continue to grow. Either deciduous trees and shrubs or conifers may be used. Grapevines should be encouraged to grow over the brushpile for added cover.

Discarded Christmas trees (without the tinsel) make ideal brush piles that will last for several years. To make them even more effective, place an old skid or some other similar material on the ground and then pile enough Christmas trees on top to make a pile about the size of pickup truck.

Regardless of the type, brushpiles add a valuable dimension to the wildlife habitat on your land. If properly located and constructed, they will provide important wildlife cover for many years. It should be noted, however, that brush piles are not permanent structure. Rot and decay will quickly reduce the effectiveness of a brush pile. In order to provide adequate escape cover, brush piles must be added to your management area on an annual basis.

## Squirrel Den Box

Studies of leaf nests and dens, show that each pair of squirrels requires three dens - one for the male, one for the female and another in which the young are born. The pair will live in one den until just before birth of the young. At this time, the female evicts the male, who then needs an additional den or nest. After the young leave the nest, the male rejoins his mate. The young require more dens; if none are available, they will either migrate to another area or will be eliminated by predators.

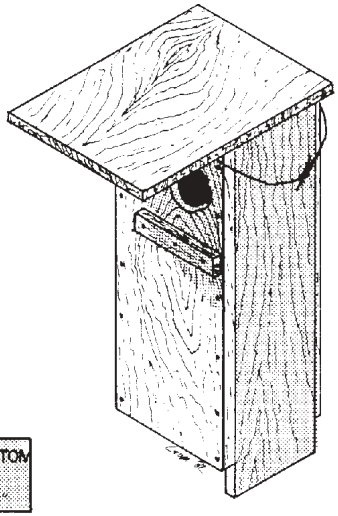
Other animals that commonly use squirrel den boxes are kestrels,

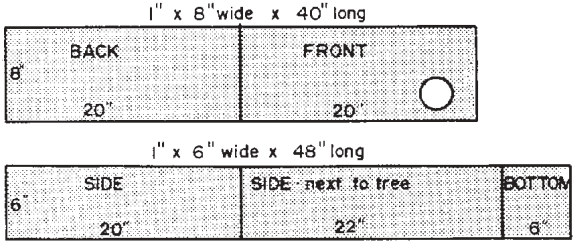
screech owls, honeybees, some woodpeckers and even black rat snakes. Crested flycatchers and other songbirds have been known to nest in squirrel den boxes.

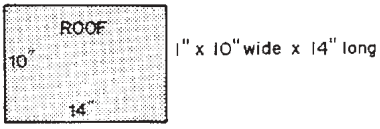
## Construction

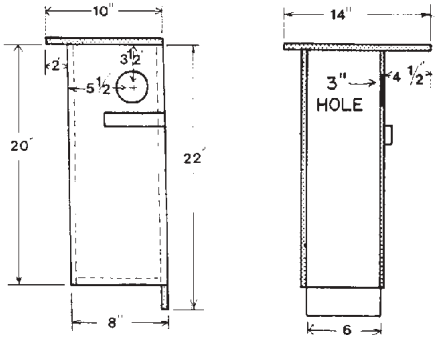
Scrap lumber of nearly any kind can be used to build a squirrel den box. Exterior-grade plywood may be used, but squirrels may damage the box by gnawing the plywood. Treated lumber is also acceptable. The main items to consider during construction are the cavity size and entrance hole. The cavity should be a minimum of 6 X 6 X 20 inches, and the entrance hole must be at least three (3) inches in diameter and located about 2 inches from the top. The hole

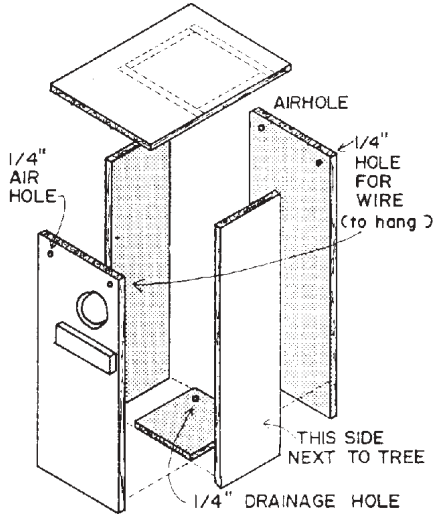
# Plans for Building a Squirrel Den Box





is located on a side that will be next to the tree trunk, however, squirrels will use the box no matter where the hole is located. The top must be weatherproof, and the bottom should have four or five small drain holes. Experience has shown that the bottom will deteriorate within about five years unless the box is cleaned at least every third year. The bottom or top may be hinged to allow cleaning. Before hanging the box, place about 3 inches of dry sawdust or leaves in the bottom to encourage its use.

A good cypress or cedar den box will last 10 years or more and furnish a home for about 20 squirrel families, or nearly 75 squirrels, in a decade of full use.

### Installation

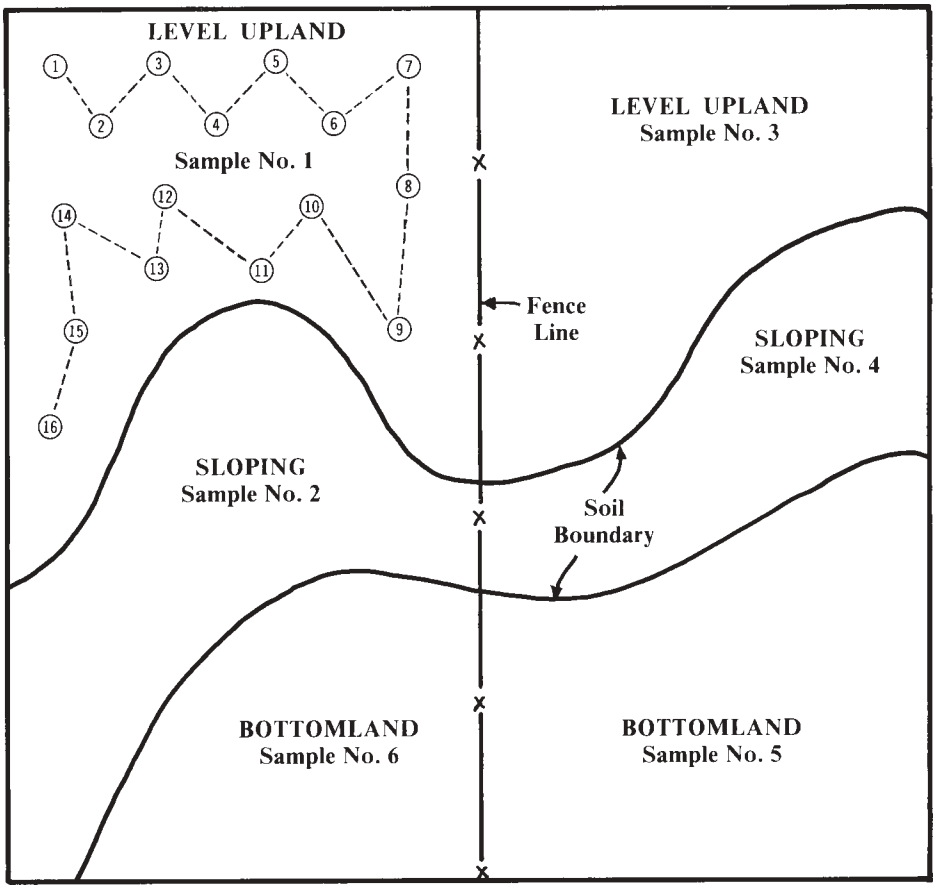
The box should be placed on a tree at a height of 10-30 feet. Use No. 9 aluminum, copper or galvanized wire to avoid rusting. If this is not available, a heavy coat hanger will do nicely. Note: several existing plans recommend that the wire pass through the box and then around the tree trunk. Experience has shown that the growth (expansion) of the tree will crush the box within a few years. A better (and easier) method to install the box is to pass the wire through holes next to the top of the box. Make a loop on each end of the wire. Hang the box from two nails driven into the tree trunk — squirrels don't seem to mind if their new home swings in the breeze a bit. Use aluminum nails if possible and bend them over the wire. Face the hole toward the south or east, away from prevailing winter winds. Boxes placed at or near the edge of large forests are more attractive to fox squirrels, and those placed well within a densely wooded area will attract gray squirrels. Squirrel box construction makes a fine home shop project during the winter months and they can be installed at any time during the year.

## How to Take a Soil Sample

The productivity of wildlife food plots and other wildlife plantings can be enhanced by testing the soil before planting ever takes place. By following soil test recommendations, landowners can expect higher fertilizer efficiency, more balanced nutrient levels and optimum benefits from lime and fertilizer investments. Soil testing should be the first step in planning a sound fertilizer program. With a soil test, the guesswork of knowing how much lime and fertilizer to apply is eliminated.

Information sheets, soil sample boxes, and sampling instructions can be obtained from your local Agriculture Extension office. These materials provide the necessary information and guidelines for collecting and mailing samples to the laboratory. There is a small fee involved for testing, based on which nutrients a landowner

wishes to test for. A pamphlet entitled "Soil Testing," available from your local Agriculture Extension office provides information about testing procedures, when to sample, laboratory tests and fees, and how to select the proper tests.




## Establishing Native Warm-Season Grasses

With the exceptions of switchgrass and eastern gammagrass, most of the native warm-season grasses produce fluffy seed. For this reason, warm-season grass seed should be purchased and planted on a pure live seed, or PLS, basis. The PLS is determined by adding the percent germination and the percent dormant seed, and then multiplying by the percent purity. These values will be shown on the seed tag or will be available from the seed dealer. Details of this calculation and a chart to determine the amount of bulk seed to plant are given in How To Calculate "Pure Live Seed'' (PLS) in this chapter.

Because of their fluffy character, most warm-season grass seeds

will not flow through a regular grain drill. Special grass drills have been developed that will accommodate this type of seed. Some of these drills may be available for loan or rent from various agricultural agencies (usually the local Soil and Water Conservation District office) throughout the state, or the Tennessee Wildlife Resources Agency. Smaller acreages can be successfully seeded by hand broadcasting seed onto a rolled seed bed, followed by rolling twice with a heavy smooth roller.

Since this seed tends to be expensive when compared to other grass seeds, you will want to use the best planting methods available. Both studies and experience have shown that planting in a clean tilled or conventional seed bed is the best method for normal conditions. Minimum or no-till seeding methods have also produced good stands of native grass, if the correct chemicals were used to kill the existing sod and to control any annual grass competition. You should consult with local agency personnel for the current information on seeding methods, seeding dates, chemical weed control and stand management.

## Seeding Rates for Planting Native Warm-Season Grasses

**Rate = Pounds per acre, Pure Live Seed (PLS)**
*(See PLS Calculation)*

**Pure Stands for Hay and/or Pasture.** (Native legumes and forbs should also be added to plantings in order to provide plant diversity. Contact seed dealer for rates.)

Big bluestem ..... 7
(Kaw, Roundtree)
Indiangrass ..... 7
(Cheyenne, Osage, Nebraska 54, Rumsey)
Switchgrass ..... 4 to 6
(Upland = Blackwell, Cave-in-rock, Trailblazer)
(Lowland = Alamo, Kanlow)
Eastern gammagrass ..... 8 to 10
(Pete, Shepherd's, PMK-24, Iuka IV)

**Mixtures Most Beneficial for Wildlife**
Wildlife plantings should not be dense stands, compared to pasture and hay plantings. Native legumes and forbs should be added to these mixtures in order to provide more plant diversity. Note: Switchgrass is not used in mixtures.

NO. 1
Big bluestem (Kaw, Roundtree) ..... 1 to 6
Indiangrass (Rumsey, Osage) ..... 1 to 6
Combination total = 7 lb./a.

NO. 2
Big bluestem (Kaw, Roundtree) ..... 1 to 3
Indiangrass (Rumsey, Osage) ..... 1 to 3
Little bluestem (Aldous) ..... ½ to 2
Combination total = 6 lb./a.

## How to Calculate ‘’Pure Live Seed” (PLS)

Most seeding rates in the past have been listed in pounds of seed per acre. These rates have not been reliable, because they do not take into account the viability of the seed. In addition, native warm-season grasses tend to be “chaffy’’ and bulky compared to domestic crop seeds such as wheat or corn. In the case of native grasses, calculation of “pure live seed” is necessary to avoid paying for material other than seed.

**Calculation Method:** (formula)
% PLS = Percent Pure Seed X (% Germination + % Dormant Seed)
**Example -** The tag from a bag of Summit Lespedeza seed lists the following information, which can be used to calculate PLS.

Labeled by: Seed Company
Kind &Variety: SUMMIT LESPEDEZA

| | | | |
|---|---|---|---|
| % Pure Seed | 99.00 | % Germination | 75 |
| % Other Crop | .10 | % Dormant (Hard) | 10 |
| % Inert Matter | .50 | % Total Germ. | 85 |
| % Weed Seed | .40 | Noxious Weeds | 432 |

Lot No. S1997 RRS3; Date Tested 11 -86; Net Wt.50 lbs.; MO Permit No. W09377; AR Permit No. R876; OK Permit No. W0279.

The percent PLS for the above lot of seed would be: 84%
% PLS = .99 X (.75 + .10)
% PLS = .99 X .85 = 84%

## Pure Live Seed

To determine PERCENT PURE LIVE SEED, locate the number where the appropriate row and column meet.

| % Purity \ % Germination | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 |
| 95 | 95 | 90 | 86 | 81 | 76 | 71 | 66 | 62 | 57 | 52 | 48 |
| 90 | 90 | 86 | 81 | 77 | 72 | 68 | 63 | 58 | 54 | 50 | 45 |
| 85 | 85 | 81 | 77 | 72 | 68 | 64 | 60 | 55 | 51 | 47 | 43 |
| 80 | 80 | 76 | 72 | 68 | 64 | 60 | 56 | 52 | 48 | 44 | 40 |
| 75 | 75 | 71 | 68 | 64 | 60 | 56 | 53 | 49 | 45 | 41 | 38 |
| 70 | 70 | 66 | 63 | 60 | 56 | 53 | 49 | 46 | 42 | 39 | 35 |
| 65 | 65 | 62 | 58 | 55 | 52 | 49 | 46 | 42 | 39 | 36 | 33 |
| 60 | 60 | 57 | 54 | 51 | 48 | 45 | 42 | 39 | 36 | 33 | 30 |
| 55 | 55 | 52 | 50 | 47 | 44 | 41 | 39 | 36 | 33 | 30 | 28 |
| 50 | 50 | 48 | 45 | 43 | 40 | 38 | 35 | 33 | 30 | 28 | 25 |

## Bulk Seed Required

To determine the AMOUNT OF BULK SEED REQUIRED, locate the % PLS of the seed to be planted (left column) and the desired PLS planting rate (top row). The bulk rate will be the number where the row and column meet.

| % PLS \ Desired pounds PLS per acre | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 30 | 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 33 |
| 40 | 3 | 5 | 8 | 10 | 13 | 15 | 18 | 20 | 23 | 25 |
| 45 | 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 22 |
| 50 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 55 | 2 | 4 | 5 | 7 | 9 | 11 | 13 | 15 | 16 | 18 |
| 60 | 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 17 |
| 65 | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 15 |
| 70 | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 13 | 14 |
| 75 | 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 13 |
| 80 | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 13 |
| 85 | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 12 |
| 90 | 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 11 |
| 95 | 1 | 2 | 3 | 4 | 6 | 6 | 7 | 8 | 9 | 11 |

# Establishment of Native Warm Season Grasses without Planting

Unless grazing or haying is intended, some NWSG species may be established without planting. This is possible because some seeds of broomsedge, little bluestem, or other warm season grasses are often present in the soil. All they need is the right conditions to germinate. Establishment of these native grasses may be done at a considerable savings of cost and time by creating those conditions. Converting old pastures or hayfields of fescue may be accomplished by burning the old field in the spring, then after the fescue has grown four to six inches, treat the fescue with herbicides. Wait three to four weeks to see if any fescue re-sprouts and spot-spray as necessary. Then allow native grasses to grow. After one year, if the NWSG stand is not acceptable, purchased NWSG seed may be drilled into the field following another spring burn.

# Developing Wetlands

Many areas in Tennessee could be developed into productive wetlands with little expense. As a landowner, your first consideration should be the overall objective for the wetland. This objective will influence both the development and management of the wetland. For example, if the objective is to benefit migrating waterfowl and to provide hunting opportunities, the wetland must be designed and managed to provide a seasonally constant (fall and early spring) water level and a sufficient quantity and quality of food to attract waterfowl. This usually requires a water control system. However, if the wetland will be used mainly for water filtration, natural flooding will accomplish this objective.

Before selecting the final site, you should consult someone with experience in wetland development and construction. Tennessee Wildlife Resources Agency personnel can inform you of any restrictions or permits that might be required before construction begins. They will also be aware of any cost-share programs that might be available.

Actually, many wetland areas in Tennessee need only be identified, preserved and protected. In such cases there is no development cost.

## Site Selection

Site selection is critical. The topography, soil type, water source, and overall objective for the wetland will influence the final site selection. The topography, or lay of the land, should be flat enough to allow shallow flooding of an area large enough to be functional.

The soil must have the capacity to hold water.

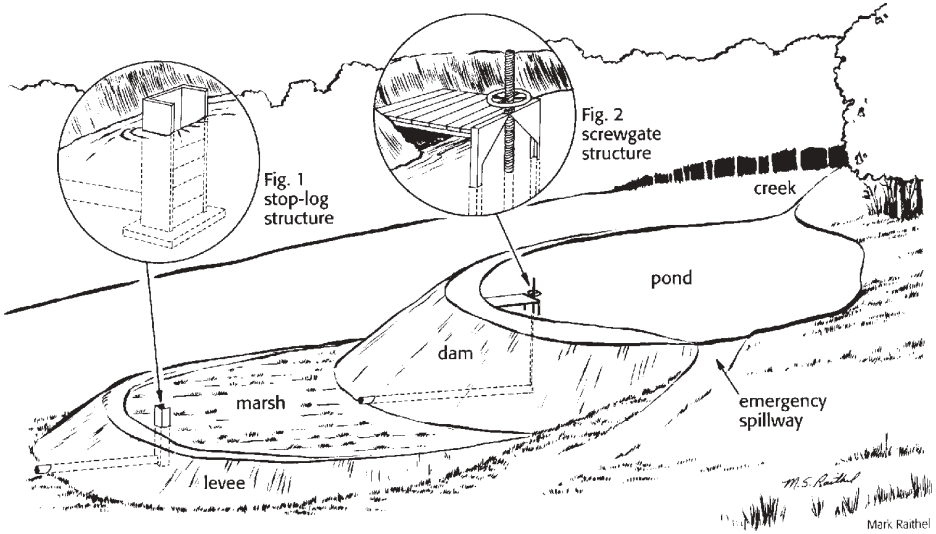
Potential sites include areas below ponds or lakes, which provide excellent water sources. Extremely wet areas in fields can often be converted back to wildlife-beneficial wetlands. If the crops in an area are ruined by floods in one year or more out of ten, it may be better to eliminate this income risk by restoring the area to a wetland.

A good water source at the site is a very important consideration, because a wetland cannot function without water. Your intended use of the wetland will dictate the quantity of water needed and the timing of delivery. The water can come from underground sources, such as wells or springs, or from ponds, lakes or streams. Pumping water from underground sources can be expensive, but will usually provide dependable water levels. If the water comes from natural sources or intermittent flooding, then flood frequency and flooding heights of the adjacent stream must be considered.

## Wetland Development

Once you have selected an appropriate site, development of the wetland can begin. Some wetlands may only require repair of natural levees, but others may need more extensive levee construction. Levee design will be determined by the intended use of the wetland and the topography of the site.

Levees should be built to a height of at least 18 inches above the water line. This amount of "freeboard" will prevent destruction of the levee by wave action and water saturation. Usually a 3:1 slope is adequate on small levees, but if the levee will be subjected to




*A stop-log gate, Fig. 1, and screw-gate valve, fig. 2, can be used to control water flow for a wetland situated below a pond. The TWRA can provide technical help in building these structures.*

overtopping by flood waters, a 6:1 slope should be used. The levee should be wide enough to allow maintenance of the top and side slopes. Riprapping the shoreline with rocks will prevent damage from burrowing animals. Levees should be constructed away from stream banks to reduce erosion by the stream.

The type of water level control device you install will be influenced by the intended use of the wetland and by the water source. A water control structure typically consists of a culvert and a gate device to stop the flow of water. Various types of gates are available; choose one to fit your specific situation.

# Wood Duck Nest Box

Wood ducks nest from mid-February to mid-March in Tennessee. Their eggs are laid in tree cavities (which are often high above the ground), or in man-made nest boxes. A dozen eggs is an average clutch, and incubation is about 28 days. Ducklings leave the nest immediately after hatching. Free falls of up to 40 feet apparently do them no harm. First flight is at about nine weeks. Two broods can occur in Tennessee. Early foods are primarily insects, but later these ducks will eat vegetable foods. They winter in the lower Mississippi Valley.

Although these nesting boxes are intended primarily for wood ducks, other species of wildlife may find them attractive for homes. Possible users include owls, kestrels, woodpeckers, hooded mergansers and even a honeybee swarm or two. All of these are important parts of the wildlife scene in Tennessee wetlands.

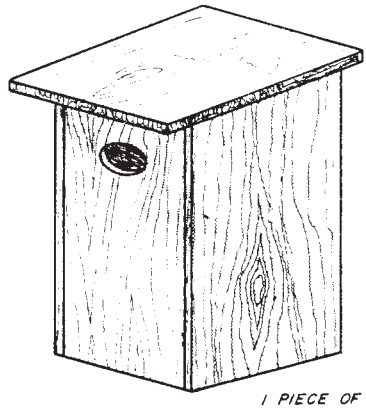
## Construction and Installation

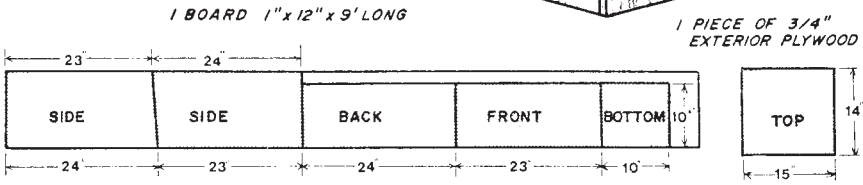
No man-made nesting device for waterfowl has gone through more design changes than that for the beautiful wood duck. Early types were usually made of wood, but newer models are constructed predominately of plastics or metal. (See diagram for construction details.) Each box should have a 6-inch-wide strip of 1/4-inch hardware cloth or screen wire stapled inside, from the bottom to the hole, so the ducklings can climb out.

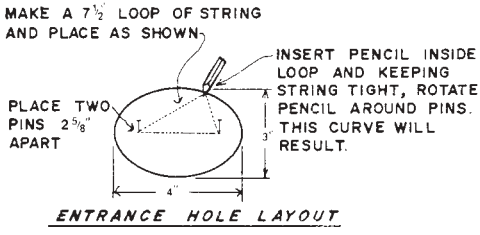
Lakes, ponds and marshes throughout the state are potential production sites for wood ducks. We recommend that all wood duck boxes be erected over water, using steel or wooden posts with predator-proof metal cones or sleeves. Place the post in water 2-4 feet deep and as far from the shoreline as possible at this depth. The bottom of the box should be no lower than 4 feet from the water surface, and higher if possible. If the water level fluctuates radically during floods or heavy rainfall, the box should be mounted above the high-water elevation. Attach the box to the post as shown in the diagram, and be sure to place nesting material (6 inches of wood

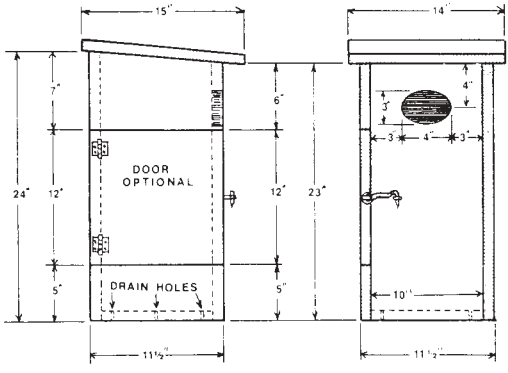
shavings or sawdust) in the box. Boxes should be erected before late January so they are available for returning wood ducks which search for nest sites in February.

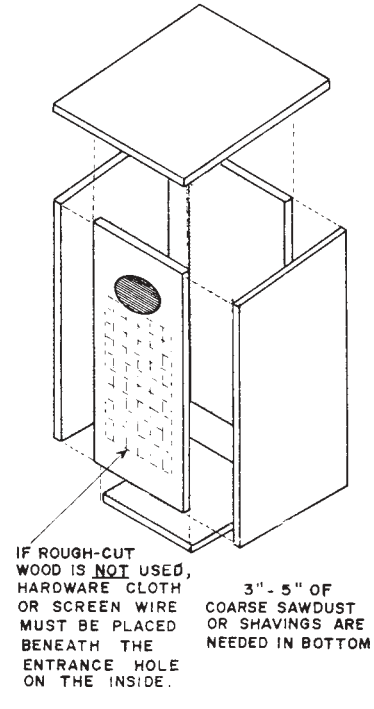
# Plans for Building a Wood Duck Nest Box





# Bluebird Nest Box

Bluebirds are year-round residents of Tennessee. Many types and styles of bluebird nest boxes will be accepted by a mated pair of birds.

## Construction

Access from the top is usually better, because those boxes that open from the side or front may result in fledglings prematurely flying from the nest at inspection time. The top may be mounted on a hinge, or a ½ -inch dowel may be substituted for the hold-down strip for the roof. If the beveled corners on the bottom are omitted, drill four 1/4-inch holes for drainage. Note that the front edges of the sides are 1/8-inch shorter than the nest box front. The resulting crack provides ventilation. The 1 ½-inch (one and one-half inch) hole size is important, since it helps to keep out starlings and cowbirds. If woodpeckers or squirrels enlarge the hole, replace the front panel or patch it with a piece of wood with a 1 ½-inch hole. Painting is not necessary, but if you do paint, light grey or tan is preferred.

## Installation and Maintenance

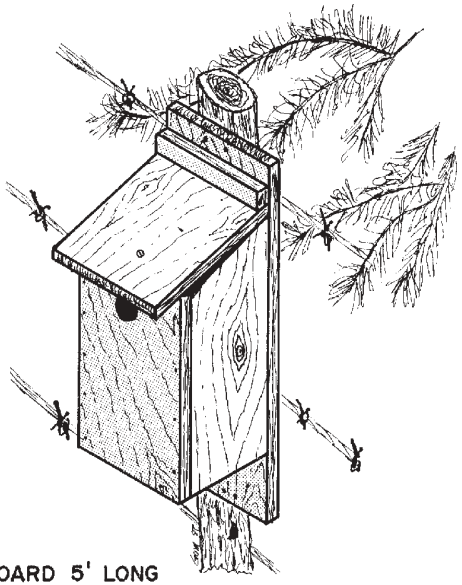
Bluebirds usually begin nesting in the first half of March. These birds lay from three to six light blue (sometimes white) eggs. The incubation period is about 14 days, and the young birds fly (fledge) from the nest about 16 days after hatching. Clean out the box as soon as the young have left, and the chances are good that the adults will use the box again. Two and three broods per year are common. If the box is not cleaned, the pair will simply build their new nest on top of the old, causing the young birds to be more accessible through the entrance hole. Many bluebirds spend the winter in Tennessee, so it is a good idea to leave the last nest for insulation.

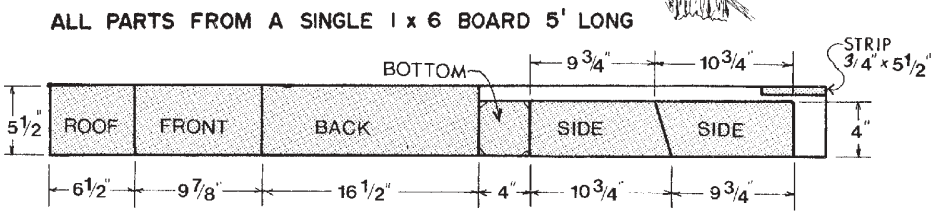
If you take the time to build and to install a bluebird nest box, you should also maintain the box on a regular basis. After a pair has accepted a next box, bluebirds are not easily driven away by your presence. You should inspect the nest box on a twelve to fifteen day interval. Gently open the box and remove any unwanted guests, such as, tree frogs, wasps, spiders, ants, etc. Sparrows can be a problem, also. Tear out their nests and temporarily plug the hole until they move elsewhere. Predators such as cats, raccoons, and snakes can destroy nests. An inverted metal cone or a metal sleeve can help keep these animals from nests. Steel fence posts or pipes coated with grease will help discourage predators.

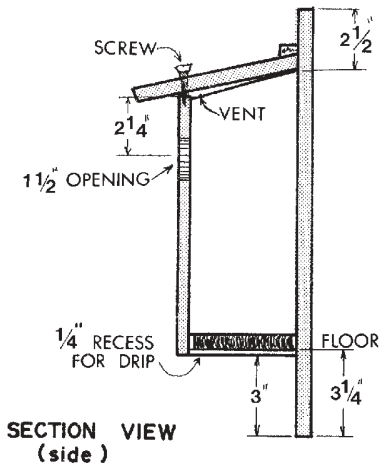
Mount your nest box four to six feet high on a post (avoid installing them on trees and power line poles) and face the entrance toward the nearest large tree or shrub. If you put up more than one

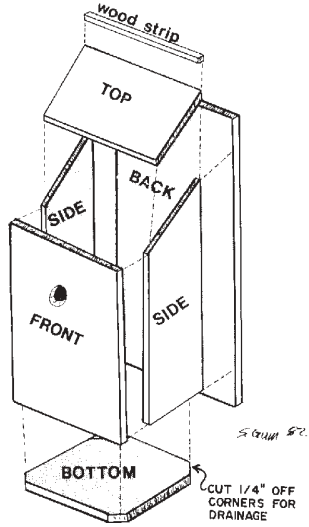
box, space them at least 100 yards apart, since bluebirds are very territorial. Bluebirds like open or lightly wooded country, but don't be afraid to place one near your residence — they seem to like being around people. Pastures with wooded draws or scattered trees are ideal. New subdivisions, cemeteries, golf courses, farmsteads and road rights-of-way are all good areas on which to install boxes.

# Plans for Building a Bluebird Nest Box





This nest box is designed for bluebirds, but it may be used by wrens, chickadees, titmice, tree swallows or even flying squirrels. If you want to attract these species, place the box in trees 10 to 15 feet above the ground in wooded areas. Place this nest box on poles or in dead trees located in or over water to attract tree swallows and prothonotary warblers.

## Bird Nest Boxes

Birds nest in all kinds of places, from ground-level to dozens of feet above ground. Natural cavities have become scarce for many species, but most of these species readily adapt to artificial nest cavities, if built properly and put up in the right place. Artificial nest cavities for birds are sometimes called “bird houses” or “bird boxes.” They can be built elaborately or simply, depending on the skill and whim of the builder.

A well-built bird box should be durable, rain-proof, cool and readily accessible for cleaning. Wood is the best building material. Except for special types (such as martin houses), metal should be avoided as it becomes intensely hot when exposed to the sun during the summer months. Use galvanized nails and hook, brass or aluminum hinges to retard rust and deterioration. Drill four one-quarter (1/4) inch holes through the floor for drainage. Also, drill one or two one-quarter (1/4) inch diameter holes in each side about one inch below the roof for ventilation.

Often a bird box will not be used the first season you erect it. This may not mean that it is built or put up improperly. However, if the house continues to be unoccupied for a year or more, one of the following may be wrong: entrance hole too small, boxes put up in the wrong habitat, box placed near another territorial bird, box placed too close or too high above ground, desired species may not occur in the area, or more nesting cavities present than the bird population can occupy.

Most birds defend a territory and will not nest too close to other birds of the same species. The size of the territory varies with each species. However, if boxes are placed at least 200-300 feet apart, this should be sufficient for most species.

Bird houses should be regularly cleaned and all intruders removed. Intruders may include mud daubers, paper wasps, ants, bees, and mice.

If predators become a problem, install a sheet metal guard that encircles the supporting pole or tree. This may be either a cone or cylinder about 18 inches long tacked to the support and placed about five feet above the ground. Metal or PVC pipes make good nest supports since cats cannot climb them.

The following table provides nest box dimensions, other specifications, and additional remarks.

## Bird Box Specifications

| Species | Floor Space (inches) | Depth of Box (inches) | Entrance (loc. & size) Height (above floor) | Entrance (loc. & size) Diameter (inches) | Feet Above Ground | Referred Habitat Codes |
|---|---|---|---|---|---|---|
| Bluebird | 5X5 | 8-9 | 6-7 | 1 ½ | 5-10 | 1 |
| Chickadee | 4X4 | 8-10 | 6-8 | 1 1/8 | 5-15 | 2 |
| Carolina wren | 4X4 | 6-8 | 4-6 | 1 ½ | 5-10 | 2,6 |
| Nuthatches | 4x4 | 8-10 | 6-8 | 1 1/4 | 12-20 | 2,6 |
| Tufted titmouse | 4X4 | 8-10 | 6-8 | 1 1/4 | 6-15 | 2 |
| Prothonotary warbler | 4X4 | 8 | 5 | 1 ½ | 4-7 | 3,5 |
| Great crested flycatcher | 6X6 | 8-10 | 6-8 | 2 | 8-20 | 1,2 |
| Yellow-bellied sapsucker | 6X6 | 14-18 | 12-16 | 1 3/4 | 12-40 | 2 (add 2" sawdust) |
| Flicker | 7X7 | 16-24 | 14-16 | 3 | 6-20 | 1,2 (add 3" sawdust) |
| Downy woodpecker | 4X4 | 8-10 | 6-8 | 1 1/4 | 10-20 | 2 (add 2" sawdust) |
| Red-headed woodpecker | 6X6 | 12-15 | 9-12 | 2 | 12-20 | 2 (add 2" wood chips) |
| Hairy woodpecker | 6X6 | 12-15 | 9-12 | 1 ½ | 12-20 | 2 (add 2" wood chips) |
| Barn owl | 10X18 | 15-18 | 4 | 6 | 12-18 | 4 |
| Screech owl | 8X8 | 12-15 | 9-12 | 3 | 10-30 | 2 (add 3" wood chips) |
| Kestrel | 8X8 | 12-15 | 9-12 | 3 | 10-30 | 10-30 |

**Referred Habitat Codes**

1. Open areas in the sun (not shaded permanently by trees), pastures, fields, or golf courses.
2. Woodland clearings or the edges of woods.
3. Above water, if on land, the entrance should face water.
4. On the trunks of large trees, or high in little used pars of barns, silos, water towers, or church steeples.
5. Moist forest bottomlands, flooded river valleys, swamps.
6. Backyards, near buildings.

Further information regarding nest boxes can be found in the publication “Woodworking for Wildlife” available from the Tennessee Wildlife Resources Agency.